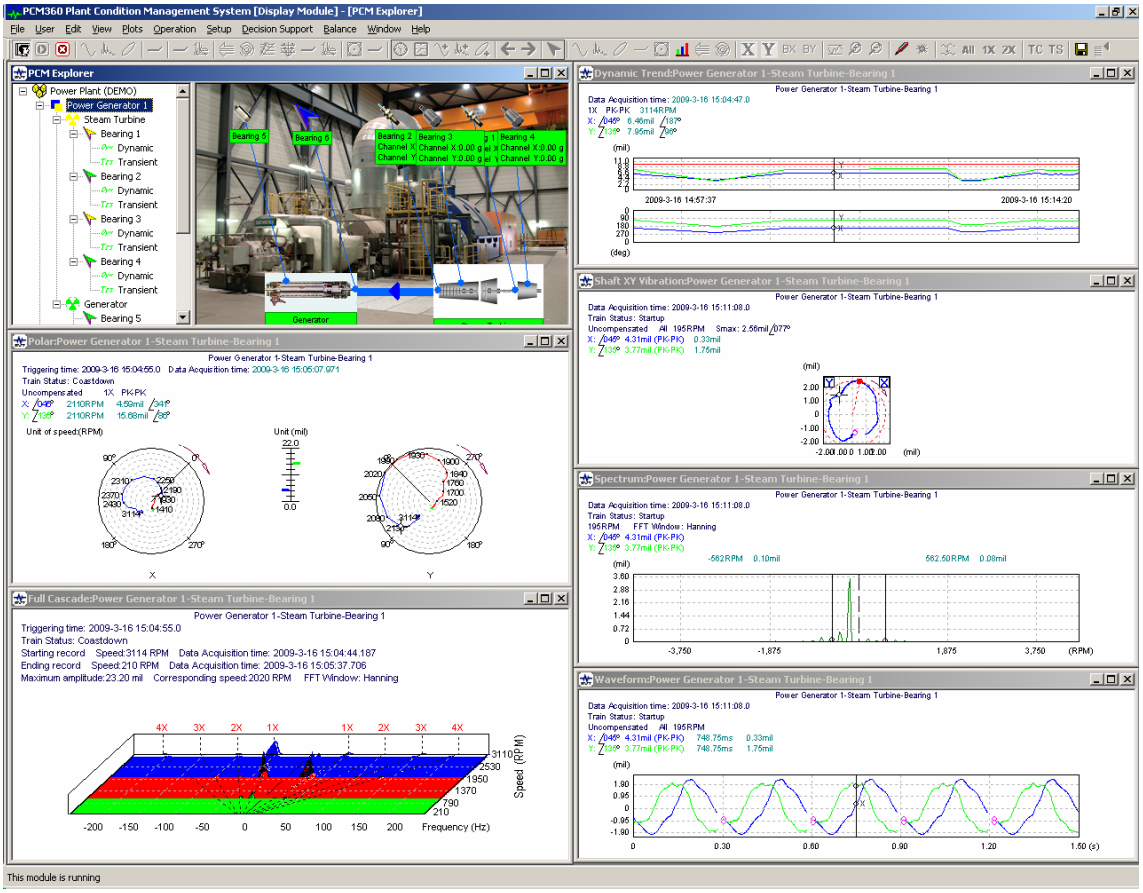
PCM360 Plant Condition Management System User Manual

Installation, Operation, Maintenance



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About This Manual

This PCM360 Plant Condition Management System User Manual focuses on the system and is applicable to the PCM360 formal edition, PCM360 demo edition and PCM360-M edition. It introduces the features of the system and the operations of all the system software in details. And it also guides you to configure the system service modules and DAQ devices. In the chapter concerning maintenance, it illustrates some typical application examples, which could help you understand the functional operation of the PCM360 system.

PCM360 System Introduction

ProvibTech's PCM360 is a machine condition management system that collects, stores, analyzes and distributes machine status monitoring information via LAN or Internet. The PCM360 provides static, dynamic and transient data collection and analysis, such as graphical indication of vibration level, trend, waveform, spectrum, bode plots, cascade plots and much more.

All ProvibTech's monitors and transmitters can quickly and easily be integrated to upload static and dynamic data to the PCM360. The PCM360 can obtain both critical machiner running status and balance of plant running status. The PCM360 is also capable of collecting process data from 4-20mA modules, modbus digital meters, and third-party monitors, etc. In summary, the PCM360 can provide an integrated system solution for asset management supplying a total solution for machine maintenance and protection.

Definition

DAQ Server: The computer that is installed wtih DAQ&COM software and directly connects to DAQ devices hardware. Each PCM360 system can have multiple DAQ Servers.

DB Server: The computer that is installed MS SQL Server 2008 (or MS SQL Server 2000) and PCM360 DBM&Server software. Each PCM360 system only needs one DB Server. **NOTE:** To make PCM360 work normally, user should keep the softdog in the USB port of DB Server.

Display Terminal: The computer that is installed with Display software. Each PCM360 system can have multiple Display Terminals.

Web Server: The computer that is installed with Web Server software. Each PCM360 system only needs one Web Server.

PCM360 DAQ&COM Software: Data acquisition and communication software, which is used to collect data in the field and receive data from digital meters based on modbus protocol or through buffer output.

PCM360 DBM&Server Software: Database Manager and Server software. DBM software is used to maintain the system database, and Server software is used to manage and configure the system services.

PCM360 Display Software: Display and analysis software, which is used to display historical plots, real-time plots and lists.

PCM360 Web Server Software: The software provides Web service and users can log on the system on any

browser.

DW Device: A digital modbus device of ProvibTech that is used for condition monitoring. PCM360 system can receive DW data (dynamic waveform data) from these devices via modbus RTU/TCP protocol. Currently, following meters of ProvibTech could be used as DW device:

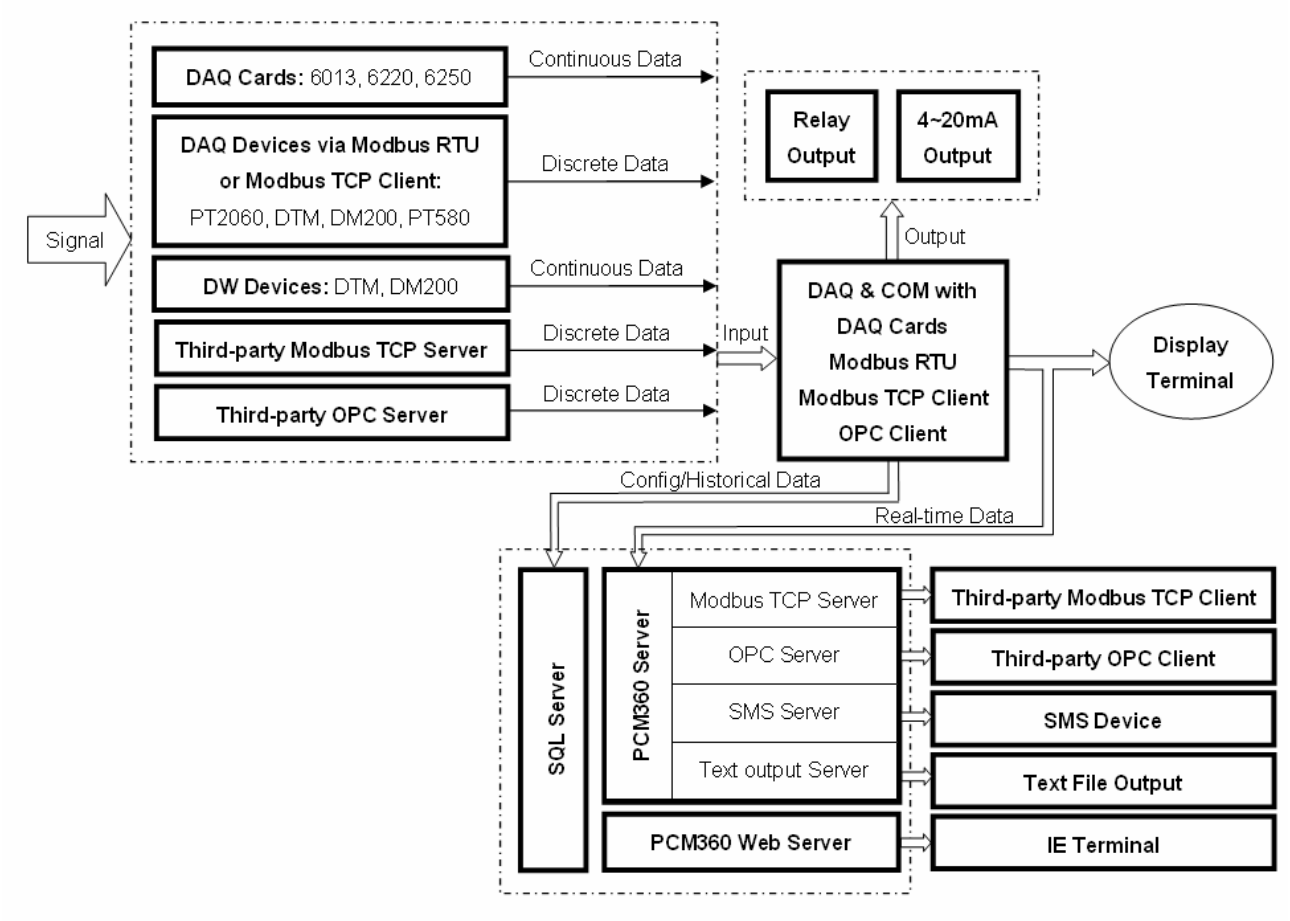
Device Name	Firmware Version
DTM10-201/301	27 or Later
DTM20-101	28 or Later
DM200	11 or Later

System Features

- ✓ Integrate plant condition monitoring and process data into one database.
- ✓ User-friendly interface for instant data analysis with minimum training.
- ✓ Maximum flexibility and expandability of the software system with object oriented modular design.
- ✓ Transient data collection, dynamic data collection and process data collection.
- ✓ Build on Microsoft® SQL Server database to assure better data management and more reliable network.
- ✓ Client/Server architecture let Display terminal has access to database to display historical data.
- ✓ Browser/Server architecture enables user to access PCM360 system via browser.
- ✓ Rich hardware input modules ready to integrate with any third-party vibration monitors and process monitors.
- ✓ Multiple digital input modules, such as modbus, and OPC.
- ✓ Multiple hardware output modules ready for further data transfer via relays and current transmission.
- ✓ 24-hours notification via on site alarms, operator interface and even SMS messaging on GPRS mobile devices.
- ✓ Advanced post-processing of transient data minimizes data loss, maximizing analysis capability.
- ✓ Save plots as .bmp format.
- ✓ Display the specific status data on Display Terminal.
- ✓ Attach notes to dynamic and transient samples.
- ✓ Multiple trigger modes: alarm trigger, band alarm trigger, time trigger, speed trigger, and manually trigger.

✓ Multiple real-time plots: waveform, waveform with DC Coupling, spectrum, shaft XY vibration, shaft XY vibration with DC Coupling, trend, shaft centerline, bode, polar, bar graph, etc.

Data Flow Diagram



Plots and Lists Supported by PCM360 Software

- **Plots**
  - ✓ Waveform plot (real-time and historical)
  - ✓ Waveform plot with DC Coupling (real-time and historical)
  - ✓ Spectrum plot (real-time and historical)
  - ✓ Full spectrum plot (real-time and historical)
  - ✓ Shaft XY vibration (real-time and historical)
  - ✓ Shaft XY vibration with DC Coupling (real-time and historical)

- ✓ Trend plot (static, dynamic, transient, historical, and real-time)
- ✓ Waterfall plot (dynamic and transient)
- ✓ Bar Graph
- ✓ Shaft centerline plot (real-time and historical)
- ✓ Bode plot (real-time and historical)
- ✓ Cascade plot
- ✓ Full cascade plot
- ✓ Polar plot (real-time and historical)
- ✓ Shaft centerline mode shape
- ✓ Shaft XY vibration mode shape
- ✓ Plot group

- **Lists**
  - ✓ Transient list
  - ✓ Alarm list
  - ✓ Status list

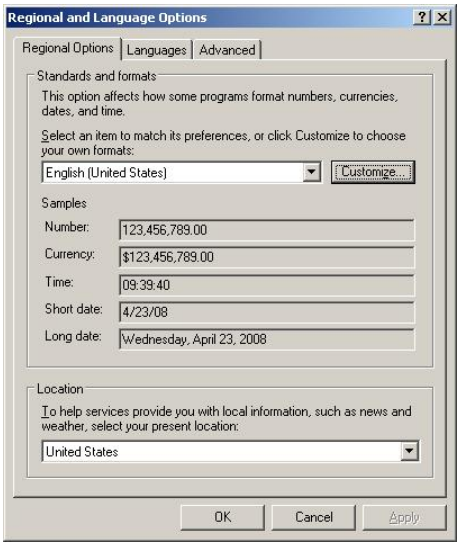
Plots Supported by Different Measurement Points

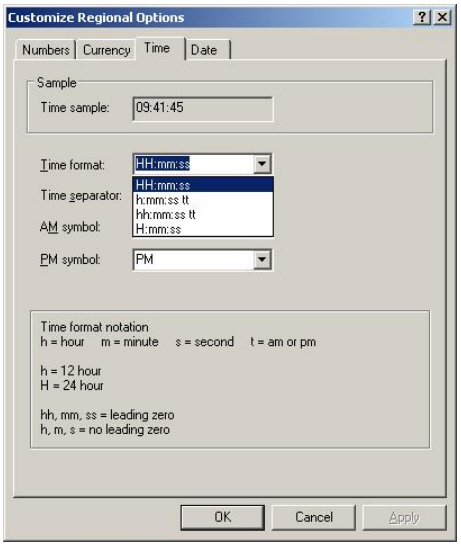
Device Type	Channel Type	Data Type	Measurement Point		Plots and Lists
			Single Channel	Dual Channel	
DAQ Card: 6013, 6220, 6250	Acceleration, Velocity	Dynamic data, Transient data	✓		bar graph, waveform, spectrum, bode, polar, cascade, (dynamic, transient) waterfall, (dynamic, transient, historical) trend, status list, alarm list, transient list
				✓	bar graph, waveform, spectrum, full spectrum, shaft XY vibration, bode, polar, cascade, full cascade, (dynamic, transient) waterfall, (dynamic, transient, historical) trend, status list, alarm list, transient list
	Vibration [from Prox]	Dynamic data, Transient data	✓		bar graph, waveform, spectrum, bode, polar, cascade, waveform with DC Coupling, (dynamic, transient) waterfall, (dynamic, transient, historical) trend, status list, alarm list, transient list
				✓	bar graph, waveform, spectrum, full spectrum, shaft XY vibration, shaft centerline, waveform with DC Coupling, shaft XY vibration with DC Coupling, bode, polar, cascade, full cascade, (dynamic, transient) waterfall, (dynamic, transient, historical) trend, status list, alarm list, transient list
	Position [from Prox], Process	Static data	✓		bar graph, static trend, status list, alarm list
				✓	
Modbus DAQ for Process	Acceleration, Velocity, Vibration [from Prox], Position [from Prox], Process	Static data	✓		bar graph, static trend, status list, alarm list
				✓	
DW device	Acceleration, Velocity, Vibration [from Prox]	Dynamic data, Static data	✓		bar graph, waveform, spectrum, dynamic waterfall, alarm list, (static, dynamic) trend, status list
				✓	bar graph, waveform, spectrum, full spectrum, shaft XY vibration, dynamic waterfall, alarm list, (static, dynamic) trend, status list
OPC Client	Acceleration, Velocity, Vibration [from Prox], Position [from Prox], Process	Static data	✓		bar graph, static trend, status list, alarm list
				✓	

System Requirements

- **Recommended Operating System:** Windows XP SP2 or later version
- **Processor:** P4 3.0GHz or faster
- **Memory:** RAM: 512MB or more
- **Hard Disk:** 80GB or more
- **Drive:** A DVD Drive
- **Screen Resolution:** 1280*1024 high color, 32-bit (Recommended)
- **System Time Format Setting:** You are strongly recommended to set **System Time Format** as [HH: mm: ss]. Please follow the steps to check or change the system time format.

  1. Open **Control Panel**;
  2. Double click **Regional Options** tab;

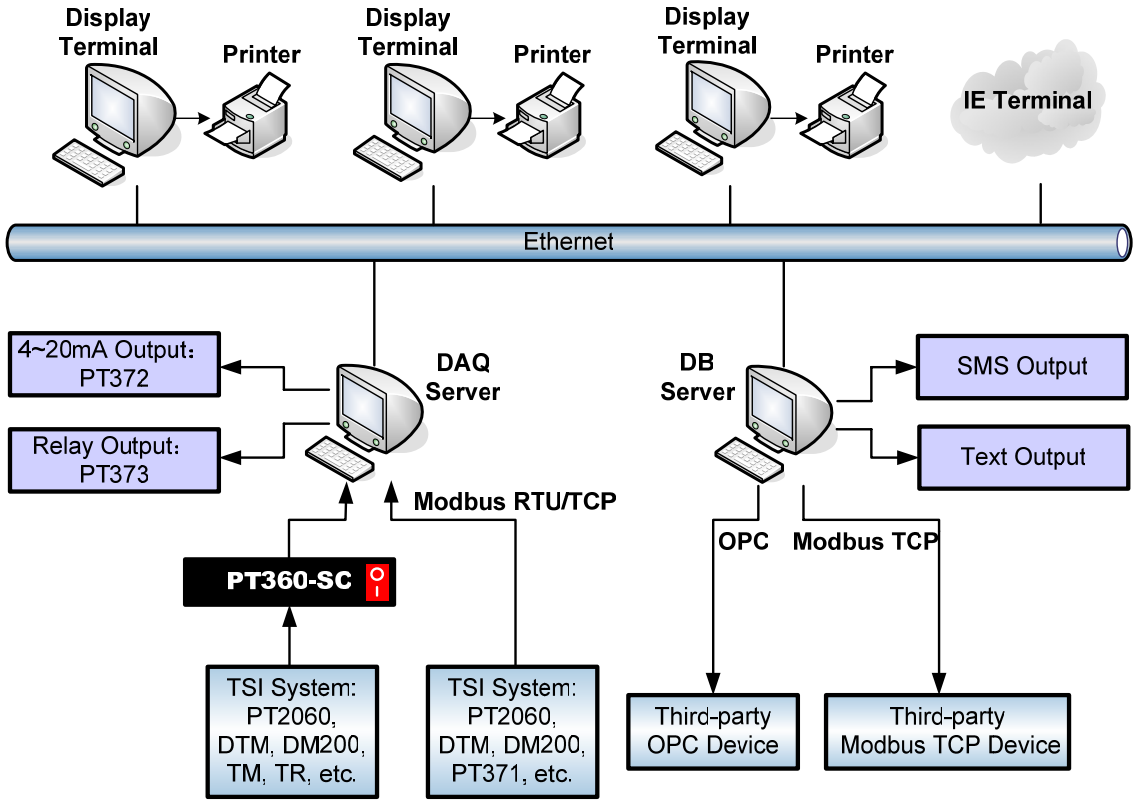




  3. Click **Customize** button on **Regional Options** tab;
  4. On **Time** tab, select **Time format** as [**HH: mm: ss**].

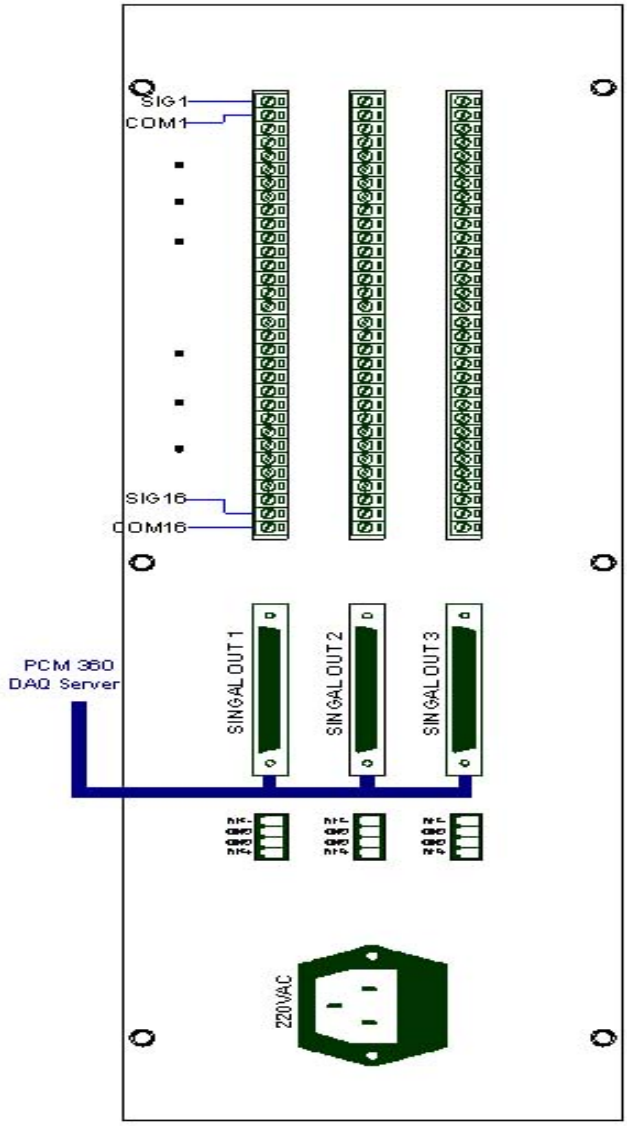
PCM360 System Installation

System Layout Diagram



NOTE: A single computer can be used as a DB Server, a DAQ Server, and also a Display Terminal, i.e. for a small setup, with relatively few monitoring points, single computer can act as the DB Server, DAQ Server and Display unit. This is a common configuration when a computer is dedicated for diagnosis and analysis on rotating machines. In addition, if you purchase Web Server, you could access the system via browser.

PT360-SC Field Wiring Diagram



MS SQL Server 2008 Setup

MS SQL Server 2008 is used for database management of PCM360 system. **It must be installed on the DB Server.** Following contents show how to install and configure MS SQL Server 2008 Workgroup (32-bit) Edition. If the system uses the MS SQL Server 2000 Personal Edition for database management, please go to ***Appendix I. Installing SQL Server 2000***.

CAUTION: Before install MS SQL Server 2008, make sure that you log on the computer by account that belongs to Windows *Administrators group* and the account password *can't be blank*. After MS

SQL Server 2008 was installed, user could log on the computer by other Windows accounts, but user is forbidden to change or disable the Windows account for SQL Server Services. Any changes on the account may cause the SQL Server Services to stop.

Update Microsoft Windows Installer

About Microsoft Windows Installer

Microsoft Windows Installer (MSI) is an application installation and configuration service for Windows that centrally manages application installation, configuration, and application uninstall. MS SQL Server 2008 Setup requires Microsoft Windows Installer 4.5 or a later version (It can be downloaded from Microsoft Download Center).

ProvibTech provides MSI 4.5 setup package on DBM&Server Installation CD. It is located in the directory of **"MS Update Pack/ Microsoft Windows Installer V4.5"**. Please select the proper setup edition according to your operating system version and platform.

- ***For Windows Vista:***

x86 Platform: Windows6.0-KB942288-v2-x86.msu

- ***For Windows Vista Service Pack 1:***

x64 Platform: Windows6.0-KB942288-v2-x64.msu

- ***For Windows Server 2008:***

IA64 Platform: Windows6.0-KB942288-v2-ia64.msu

- ***For Windows Server 2003 Service Pack 1:***

x86 Platform: WindowsServer2003-KB942288-v4-x86.exe

- ***For Windows Server 2003 Service Pack 2:***

x64 Platform: WindowsServer2003-KB942288-v4-x64.exe

- ***For Windows XP 64-bit Editions:***

IA64 Platform: WindowsServer2003-KB942288-v4-ia64.exe

- ***For Windows XP Service Pack 2 and Windows XP Service Pack 3 (32-bit platforms):***

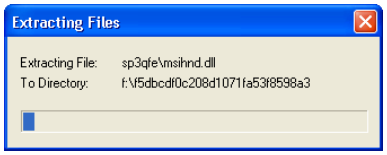
x86 Platform: WindowsXP-KB942288-v3-x86.exe

For complete information on installing or upgrading Windows installer, please see the **Microsoft Website**.

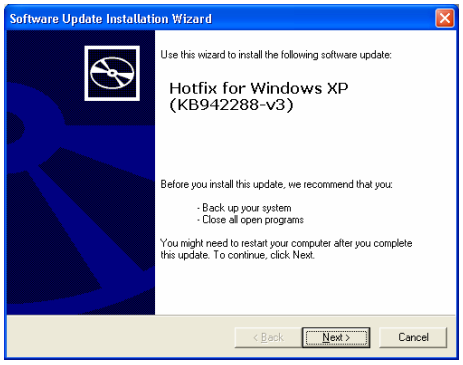
In this chapter, we take Windows XP Service Pack 2 (32-bit) operating system as an example, and will guide you through steps to install MSI 4.5.

Installing Microsoft Windows Installer V4.5

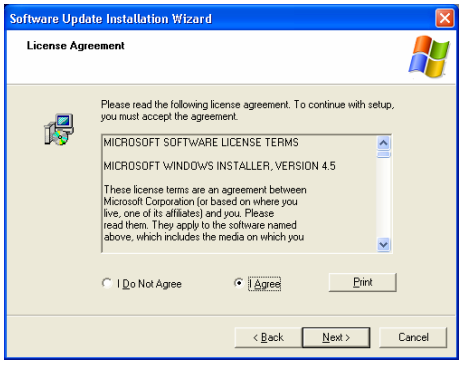
1. Insert DBM&Server CD into the DVD-ROM, and select **MS Update Pack**, **Microsoft Windows Installer V4.5**, **Windows XP x86** from the root folder of the DVD-ROM. And then double click WindowsXP-KB942288-v3-x86.exe. You will see the "Extracting Files" window.



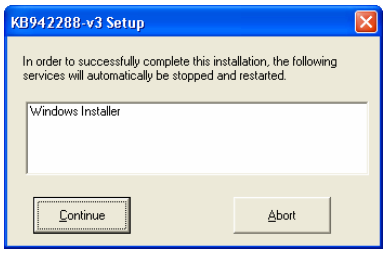
A few seconds later, you will see the following dialog box. Click **Next** button to proceed with the installation.


Software Update Installation Wizard
Use this wizard to install the following software update:
Hotfix for Windows XP (KB942288-v3)
Before you install this update, we recommend that you:
- Back up your system
- Close all open programs
You might need to restart your computer after you complete this update. To continue, click Next.
< Back
Next >
Cancel

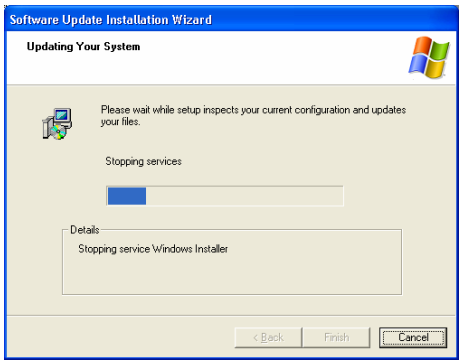
2. "License Agreement" dialog box is launched. Select "I Agree" button and then click **Next** button.


Software Update Installation Wizard
License Agreement
Please read the following license agreement. To continue with setup, you must accept the agreement.
MICROSOFT SOFTWARE LICENSE TERMS
MICROSOFT WINDOWS INSTALLER, VERSION 4.5
These license terms are an agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. Please read them. They apply to the software named above, which includes the media on which you
I Do Not Agree
I Agree
Print
< Back
Next >
Cancel

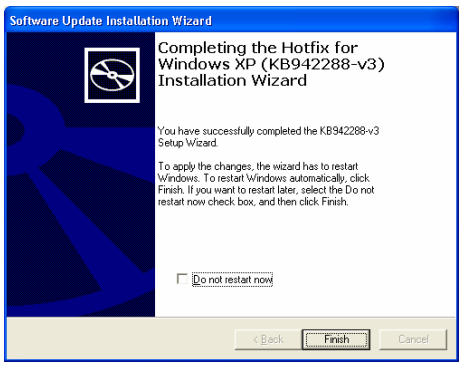
3. The Setup will scan the services that are running. Click **Continue** button.


KB942288-v3 Setup
In order to successfully complete this installation, the following services will automatically be stopped and restarted.
Windows Installer
Continue
Abort

4. The Setup is inspecting the current configuration and updating the files.



The installation finished. See picture below.


Software Update Installation Wizard
Completing the Hotfix for Windows XP (KB942288-v3) Installation Wizard
You have successfully completed the KB942288-v3 Setup Wizard.
To apply the changes, the wizard has to restart Windows. To restart Windows automatically, click Finish. If you want to restart later, select the Do not restart now check box, and then click Finish.
Do not restart now
< Back
Finish
Cancel

Since MSI version 4.5 won't take effect until the computer is restarted, you should leave "Do not restart now" unchecked and then click Finish button.

Additional patches for SQL Server Express

Additional patches as follows:

Windows Power Shell：KB926140.

Windows Remote Management：KB936059.

Select the corresponding operating system patches and install all the patches in a similar way as Microsoft Windows Installer.

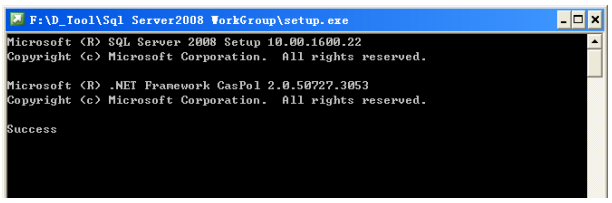
Installing SQL Server 2008

If the DB Server uses Windows XP SP2 operating system, we recommend that you purchase the MS SQL Server 2008 Workgroup (32-bit) Edition.

1. Insert the SQL Server 2008 Work Group Installation Media into the DVD-ROM. From the root folder, double-click Setup.exe. SQL Server Setup will scan the system environment first (In some Windows operating system, the result might not be displayed normally, but it doesn't affect the installation process).

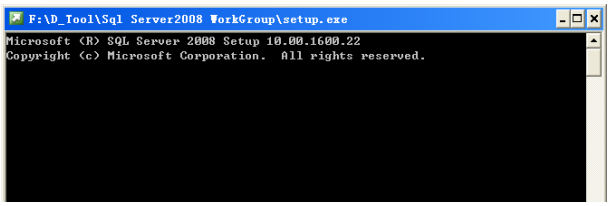
The version information about SQL Server 2008 work group and .NET Framework is checked by SQL Server Setup.

- If SQL Server 2008 find the .NET Framework version 2.0, you will see the window like below:

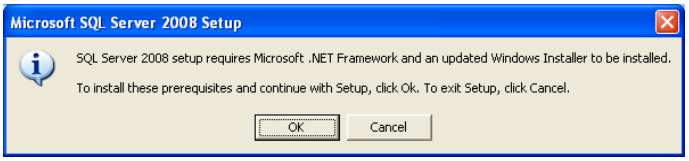

F:\D_Tool\Sql Server2008 WorkGroup\setup.exe
Microsoft (R) SQL Server 2008 Setup 10.00.1600.22
Copyright (c) Microsoft Corporation. All rights reserved.
Microsoft (R) .NET Framework CasPol 2.0.50727.3053
Copyright (c) Microsoft Corporation. All rights reserved.
Success

The SQL Server Setup will launch the waiting window. You may wait a few minutes. Never do any operation during the waiting time. After that, you will go to step "**2**".

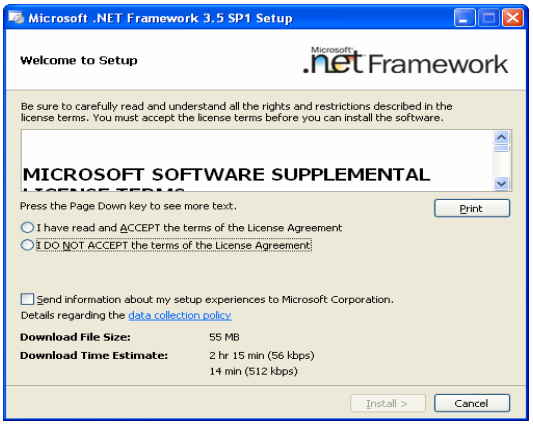
- If the SQL Server Setup can't find Framework version 2.0, you will see the window like below:


F:\D_Tool\Sql Server2008 WorkGroup\setup.exe
Microsoft (R) SQL Server 2008 Setup 10.00.1600.22
Copyright (c) Microsoft Corporation. All rights reserved.

Then SQL Server Setup will launch the following dialog box. Click **OK** button to install .NET Framework.

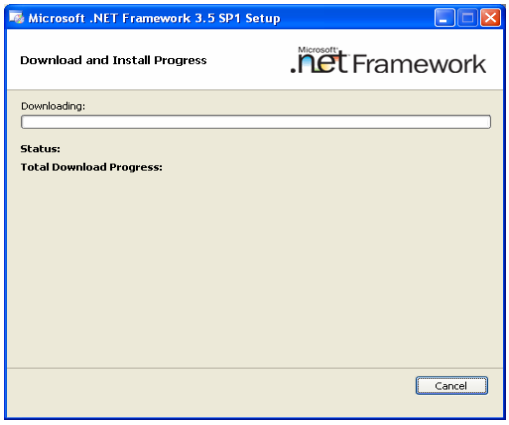

Microsoft SQL Server 2008 Setup
SQL Server 2008 setup requires Microsoft .NET Framework and an updated Windows Installer to be installed.
To install these prerequisites and continue with Setup, click Ok. To exit Setup, click Cancel.
OK
Cancel

The SQL Server Setup will launch "Welcome to Setup" window. On the window, select radio button of "I have read and ACCEPT the terms of the License Agreement". And then click **Install** button.

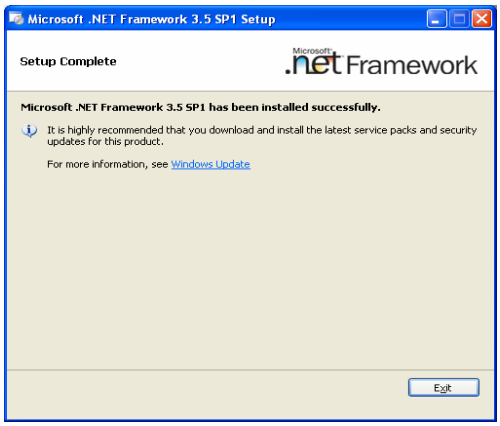

Microsoft .NET Framework 3.5 SP1 Setup
Welcome to Setup
Microsoft .net Framework
Be sure to carefully read and understand all the rights and restrictions described in the license terms. You must accept the license terms before you can install the software.
MICROSOFT SOFTWARE SUPPLEMENTAL
Press the Page Down key to see more text.
Print
I have read and ACCEPT the terms of the License Agreement
I DO NOT ACCEPT the terms of the License Agreement
Send information about my setup experiences to Microsoft Corporation.
Details regarding the data collection policy
Download File Size: 55 MB
Download Time Estimate: 2 hr 15 min (56 kbps)
14 min (512 kbps)
Install >
Cancel

The SQL Server Setup will launch "Download and Install Progress" window. And it will automatically connect to the internet to download the most recent version of .NET Framework. If the connection failed,

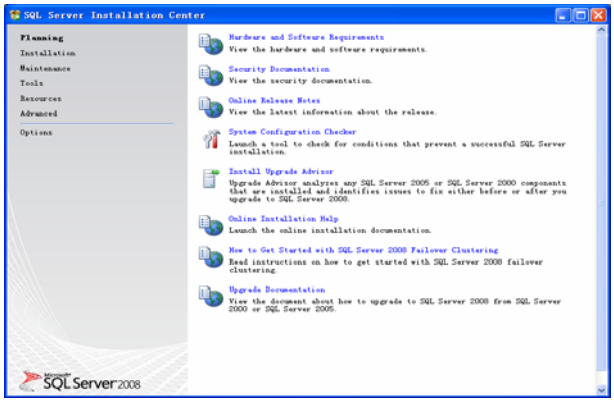
the Setup will try another 4 times. And if it still failed, the Setup will install the .NET Framework from the local computer.



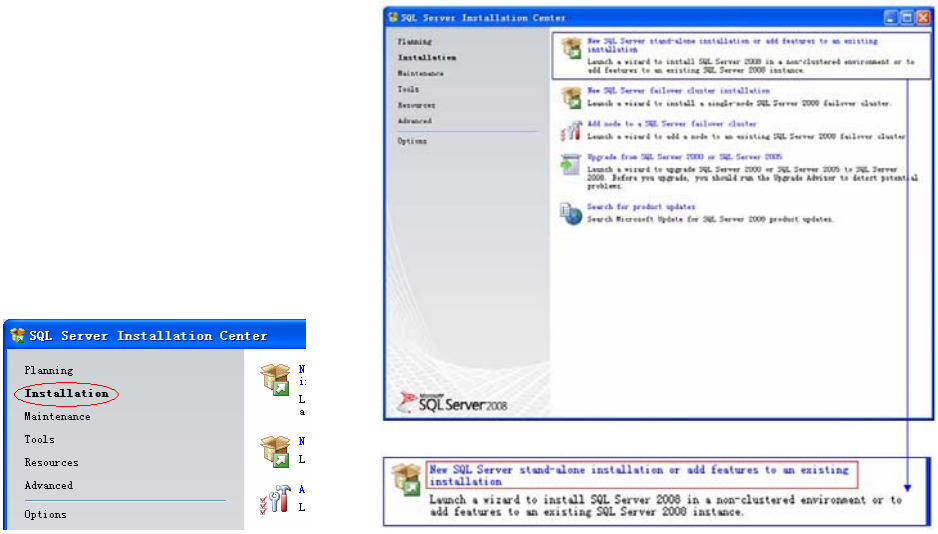
The .NET Framework is installed successfully. Click **Exit** button.


Microsoft .NET Framework 3.5 SP1 Setup
Setup Complete
Microsoft .net Framework
Microsoft .NET Framework 3.5 SP1 has been installed successfully.
It is highly recommended that you download and install the latest service packs and security updates for this product.
For more information, see Windows Update
Exit

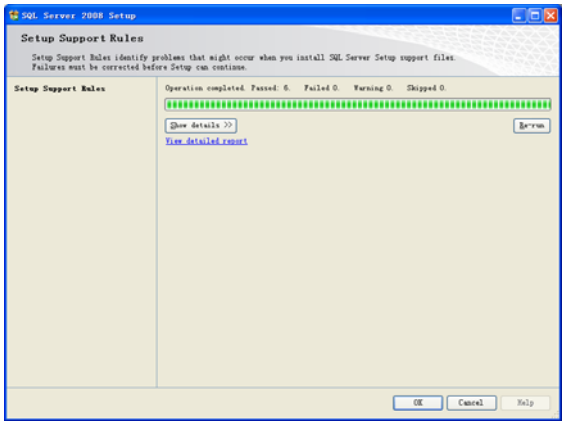
2. The SQL Server Setup will launch"SQL Server Installation Center" window.


SQL Server Installation Center
Planning
Installation
Maintenance
Tools
Resources
Advanced
Options
Hardware and Software Requirements
View the hardware and software requirements.
Security Documentation
View the security documentation.
Online Release Notes
View the latest information about the release.
System Configuration Checker
Launch a tool to check for conditions that prevent a successful SQL Server installation.
Install Upgrade Advisor
Upgrade Advisor analyzes any SQL Server 2005 or SQL Server 2000 components that are installed and identifies issues to fix either before or after you upgrade to SQL Server 2008.
Online Installation Help
Launch the online installation documentation.
How to Get Started with SQL Server 2008 Failover Clustering
Read instructions on how to get started with SQL Server 2008 failover clustering.
Upgrade Documentation
View the document about how to upgrade to SQL Server 2008 from SQL Server 2000 or SQL Server 2005.
SQL Server 2008

Select "Installation" on the installation guide left side, and select "New SQL Server stand-alone installation or add features to an existing installation" from the right side.

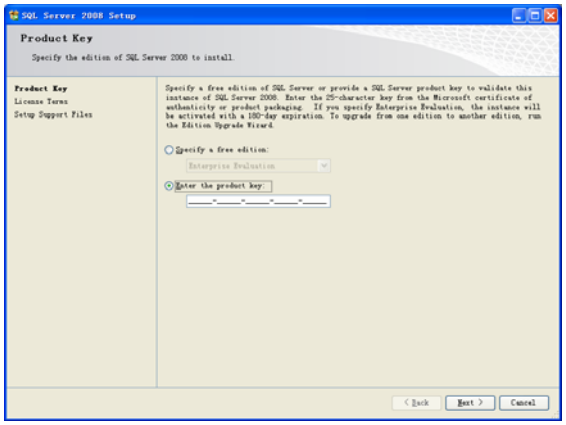

SQL Server Installation Center
Planning
Installation
Maintenance
Tools
Resources
Advanced
Options
SQL Server 2008
New SQL Server stand-alone installation or add features to an existing installation
Launch a wizard to install SQL Server 2008 in a non-clustered environment or to add features to an existing SQL Server 2008 instance.

3. The SQL Server Setup will launch “Setup Support Rules” window.


SQL Server 2008 Setup
Setup Support Rules
Setup Support Rules identify problems that might occur when you install SQL Server Setup support files. Failures must be corrected before Setup can continue.
Setup Support Rules
Operation completed. Passed: 6. Failed 0. Warning 0. Skipped 0.
Show details >>
Re-run
View detailed report
OK
Cancel
Help

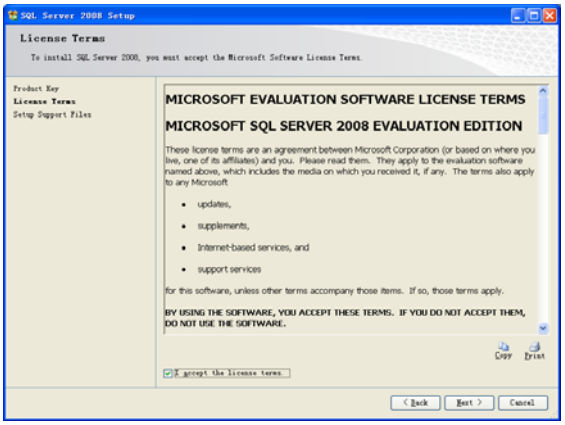
Click **Show details >>** button to view the details. If “Failed” items existed, **OK** button will be inactivated. You must correct them before the installation can be continued.

4. The SQL Server Setup will launch “Product Key” window. Select “Enter the product key” radio button, and then enter the 25-character product key. You could get the product key on the installation CD.

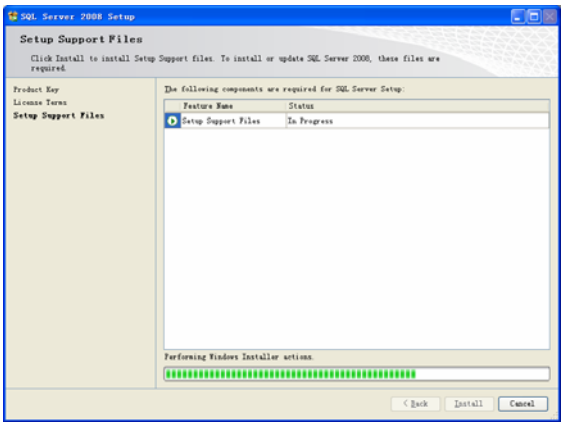


If installing a free edition of SQL Server, you should select “Specify a free edition” and then select “Enterprise Evaluation” from the list. **Note** that the trial period for the free edition is 180-day!

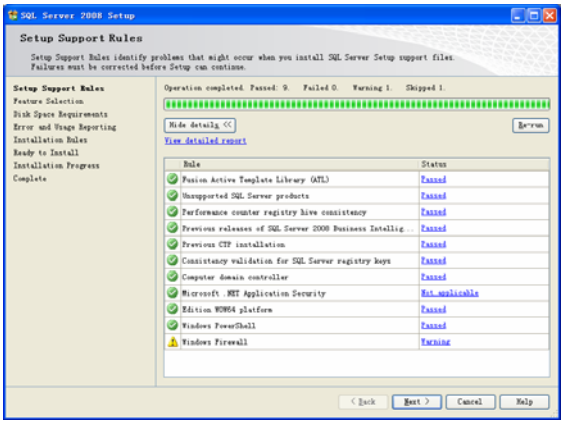
After that the SQL Server Setup will launch “License Terms” window. Select “I accept the license terms” check box and click **Next** button.



The SQL Server Setup will launch “Setup Support Files” window below. Click **Install** button.

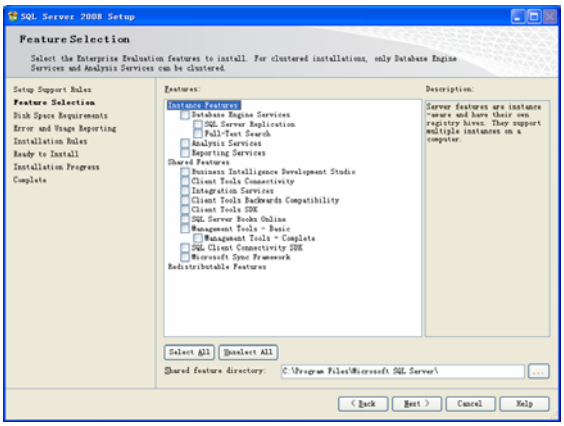


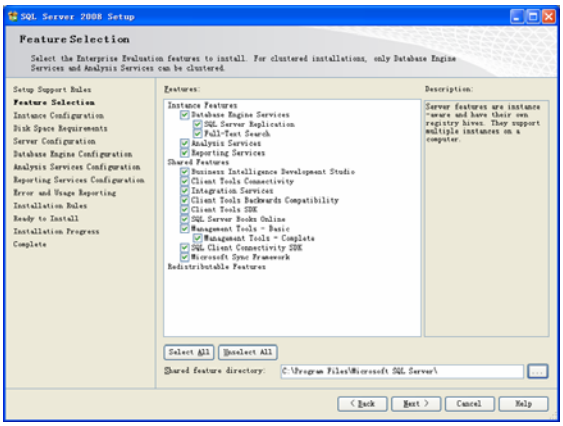
5. The SQL Server Setup will launch “Setup Support Rules” window.



If “Failed” items existed, **OK** button will be inactivated. You must correct them before the installation can be continued.

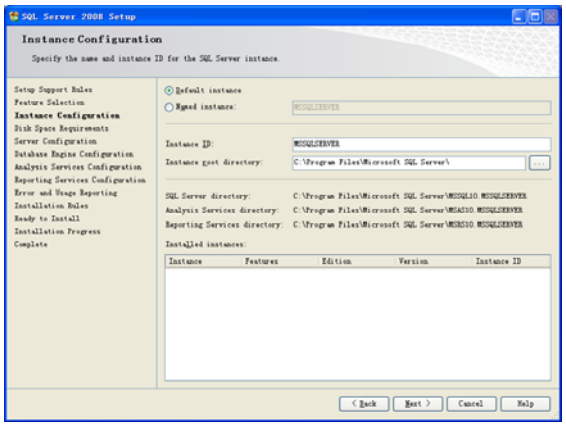
6. The SQL Server Setup will launch “Feature Selection” window.



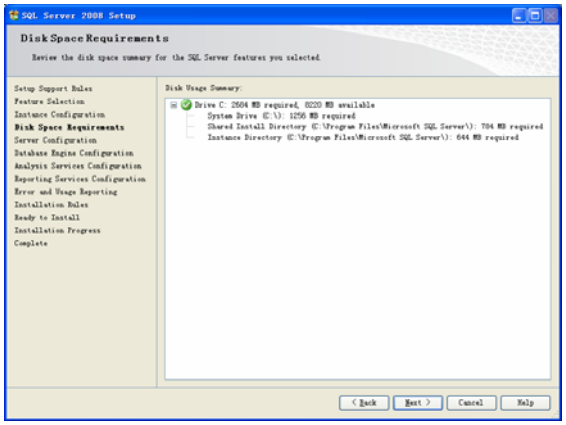


Click **Select All** button and use the default feature directory. And then click **Next** button.

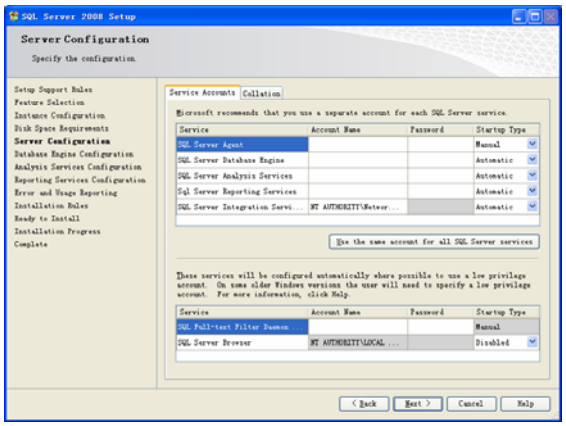
7. The SQL Server Setup will launch “Instance Configuration” window. Select “Default instance” radio button, and use the default Instance ID and root directory. And then click **Next** button.



The SQL Server Setup will check the disk space and show the result on the “Disk Space Requirements” window. Click **Next** button.

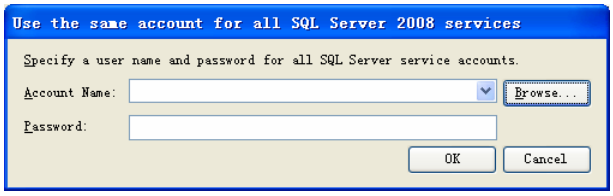


8. The SQL Server Setup will launch “Server Configuration” window. Click “Use the same account for all SQL Server services” button.

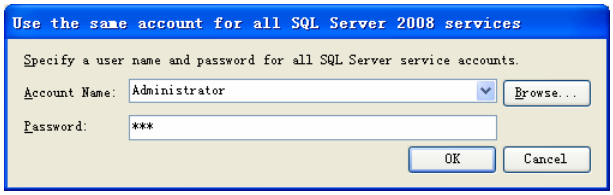


On the following window, type the name and password of the current Windows account. Later click **OK** button.

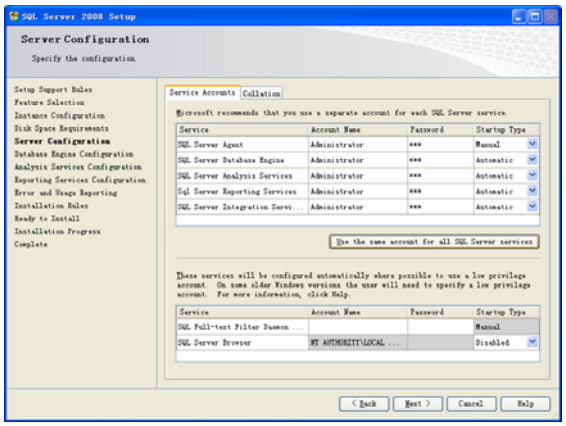
Note that the account must belong to the Windows Administrators group and the password must not be blank.


Use the same account for all SQL Server 2008 services
Specify a user name and password for all SQL Server service accounts.
Account Name:
Browse...
Password:
OK
Cancel

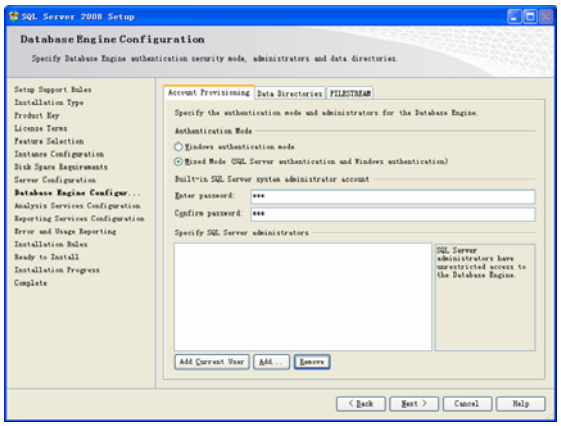
For example, the current Windows account is “Administrator”.



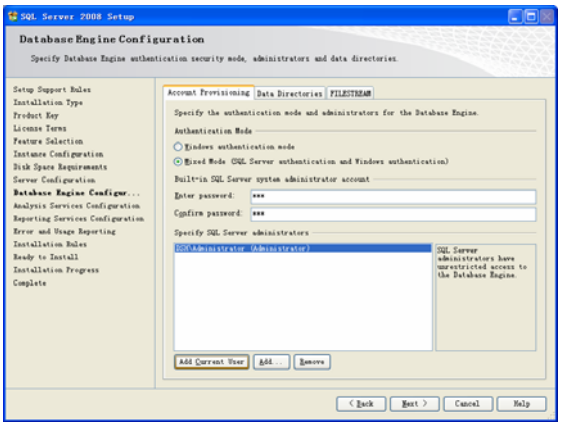
Picture below shows the window after the account information was set. Later click **Next** button to continue the installation.



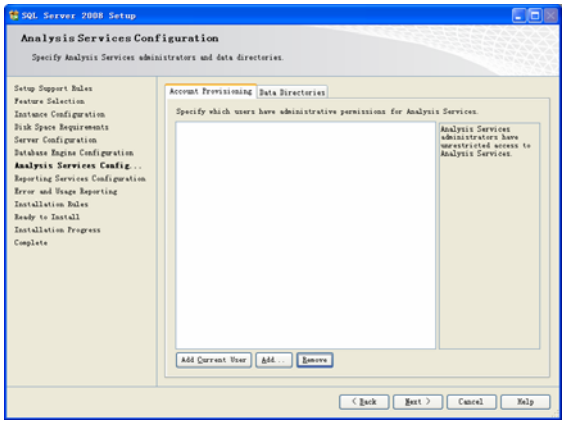
9. The SQL Server Setup will launch “Database Engine Configuration” window.



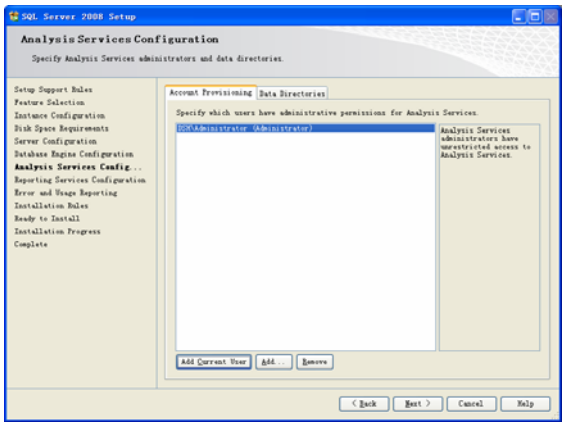
Select “Account Provisioning” tab and select “Mixed Mode (SQL Server authentication and Windows authentication)” radio button. Then type the logon password of the current Windows account. Later click **Add Current User** button.



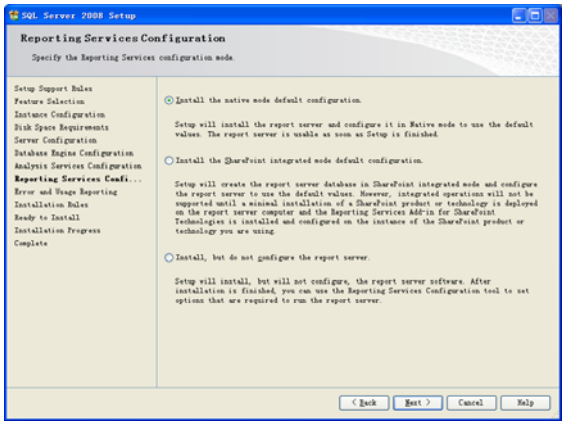
10. The SQL Server Setup will launch “Analysis Services Configuration” window.



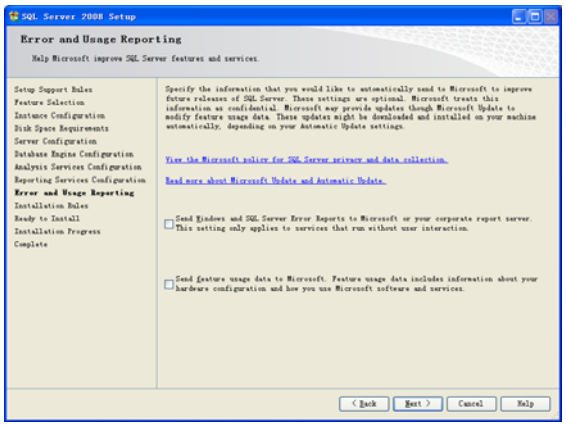
Select “Account Provisioning” tab and click **Add Current User** button. Then click **Next** button.



11. The SQL Server Setup will launch “Reporting Services Configuration” window.

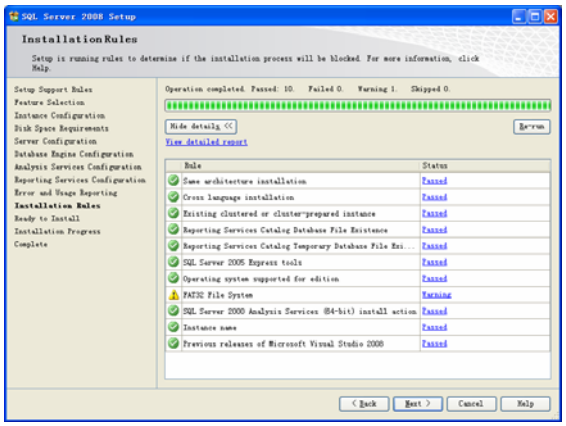

SQL Server 2008 Setup
Reporting Services Configuration
Specify the Reporting Services configuration mode.
Setup Support Rules
Feature Selection
Instance Configuration
Disk Space Requirements
Server Configuration
Database Engine Configuration
Analysis Services Configuration
Reporting Services Confi...
Error and Usage Reporting
Installation Rules
Ready to Install
Installation Progress
Complete
Install the native mode default configuration.
Setup will install the report server and configure it in Native mode to use the default values. The report server is usable as soon as Setup is finished.
Install the SharePoint integrated mode default configuration.
Setup will create the report server database in SharePoint integrated mode and configure the report server to use the default values. However, integrated operations will not be supported until a minimal installation of a SharePoint product or technology is deployed on the report server computer and the Reporting Services Add-in for SharePoint Technologies is installed and configured on the instance of the SharePoint product or technology you are using.
Install, but do not configure the report server.
Setup will install, but will not configure, the report server software. After installation is finished, you can use the Reporting Services Configuration tool to set options that are required to run the report server.
< Back
Next >
Cancel
Help

Select “Install the native mode default configuration” radio button and click **Next** button.


SQL Server 2008 Setup
Error and Usage Reporting
Help Microsoft improve SQL Server features and services.
Setup Support Rules
Feature Selection
Instance Configuration
Disk Space Requirements
Server Configuration
Database Engine Configuration
Analysis Services Configuration
Reporting Services Configuration
Error and Usage Reporting
Installation Rules
Ready to Install
Installation Progress
Complete
Specify the information that you would like to automatically send to Microsoft to improve future releases of SQL Server. These settings are optional. Microsoft treats this information as confidential. Microsoft may provide updates through Microsoft Update to modify feature usage data. These updates might be downloaded and installed on your machine automatically, depending on your Automatic Update settings.
View the Microsoft policy for SQL Server privacy and data collection.
Read more about Microsoft Update and Automatic Update.
Send Windows and SQL Server Error Reports to Microsoft or your corporate report server. This setting only applies to services that run without user interaction.
Send feature usage data to Microsoft. Feature usage data includes information about your hardware configuration and how you use Microsoft software and services.
< Back
Next >
Cancel
Help

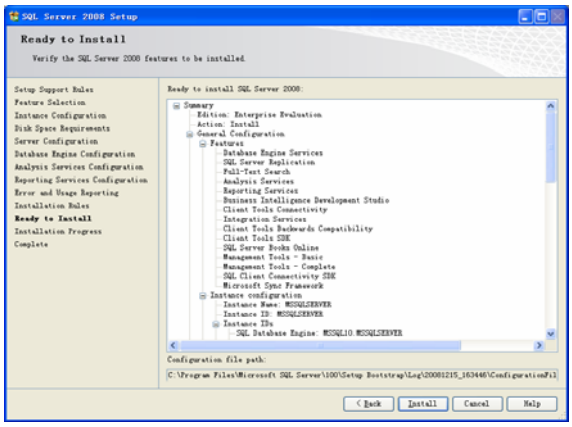
Then you will see “Error and Usage Reporting” window. Click **Next** button.

12. The SQL Server Setup will launch “Installation Rules” window.

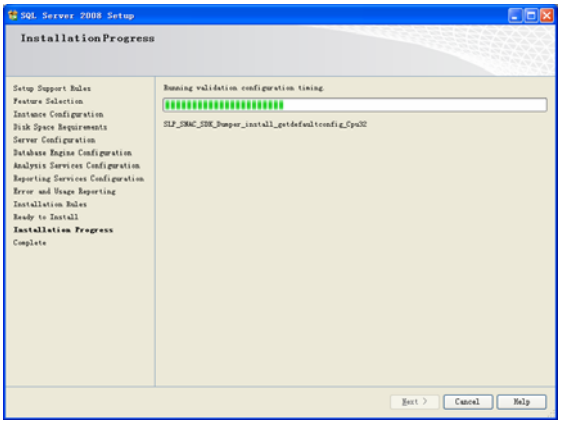


If “Failed” items existed, **OK** button will be inactivated. You must correct them before the installation can be continued.

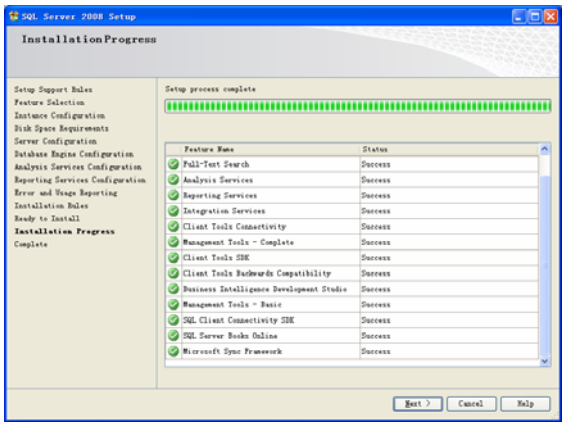
13. The SQL Server Setup will launch “Ready to Install” window.



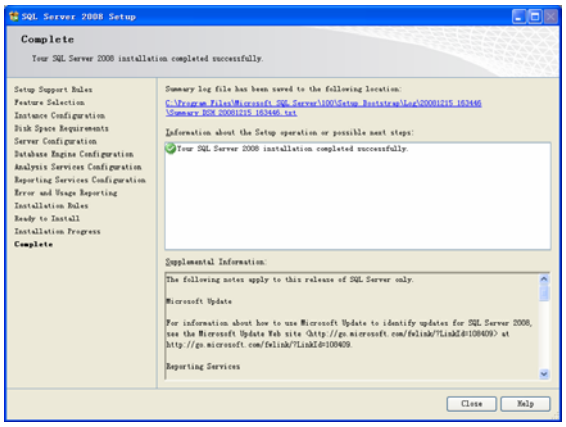
Click **Install** button to start the installation progress.



Click **Next** button.



Then SQL Server Setup will launch “Complete” window. Click **Close** button to exit.



Please restart your computer after the MS SQL Server 2008 was installed.

Configure MS SQL Server 2008

After installing SQL Server, you should configure the MS SQL Server.

Activate the ‘sa’ Account

Select Windows **Start**->**All Programs**->**Microsoft SQL Server 2008**->**SQL Server Management Studio**.

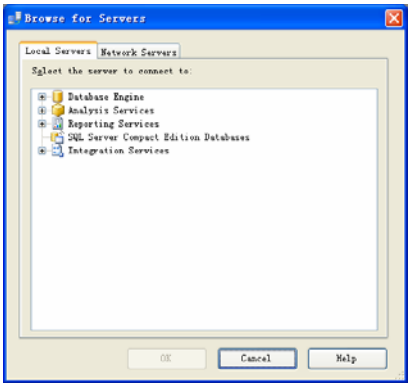
Then “Connect to Server” window is launched. Set **Server type** option as “Database Engine”.



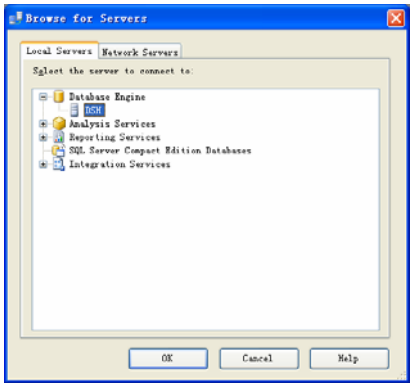
If the Server name option is blank, you should select “Browse for more…” from the list.



Then following window is launched.

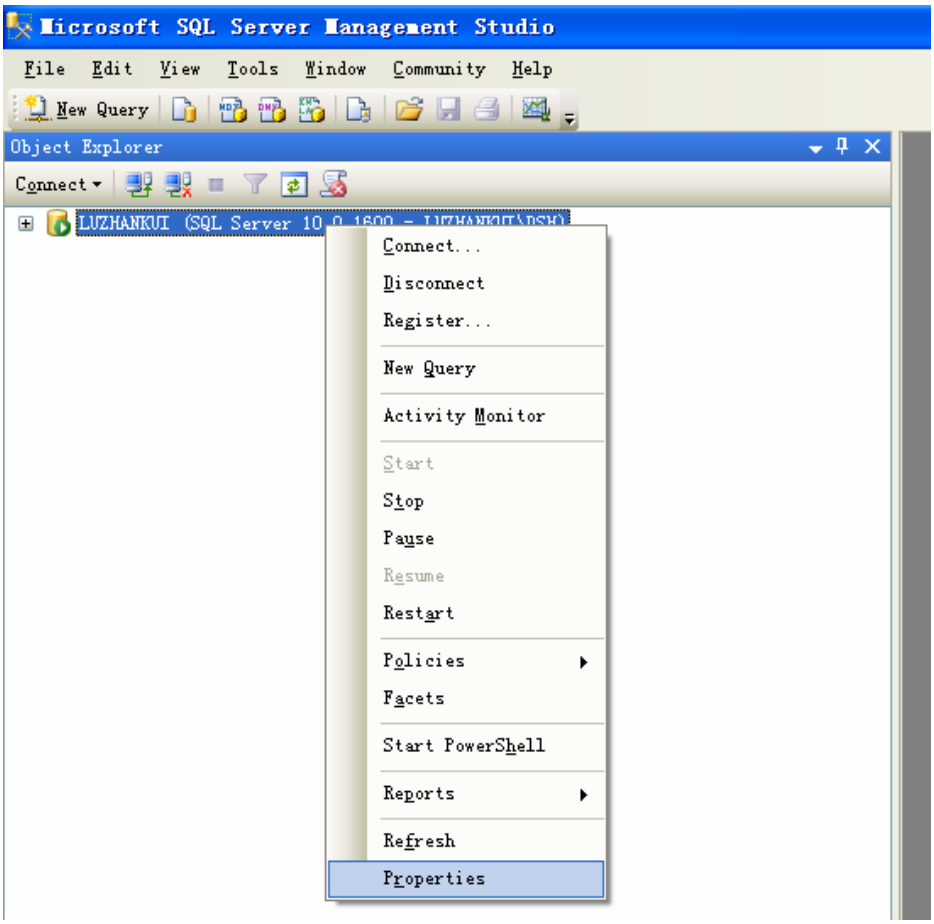


Select “Local Servers” and open “Database Engine” node, and then select the server name, for example:”DSH”.

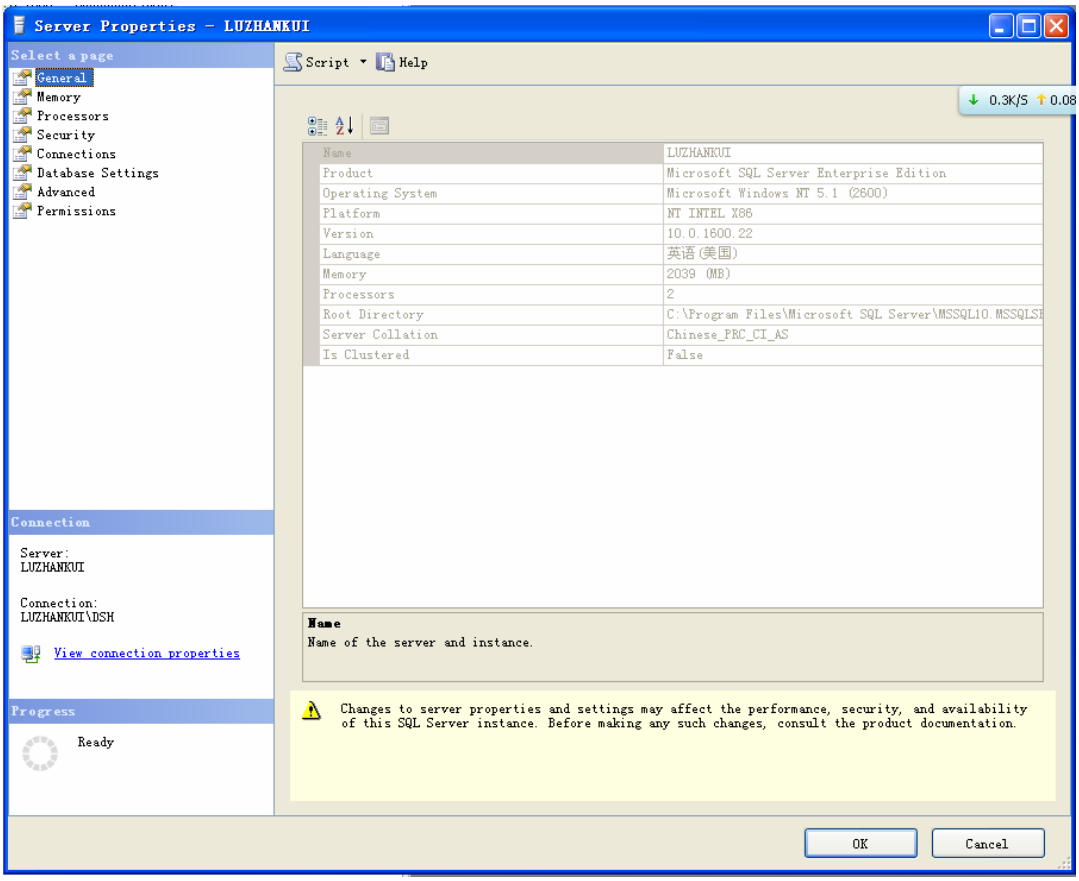


Later click **OK** button to return to “Connect to Server” window.

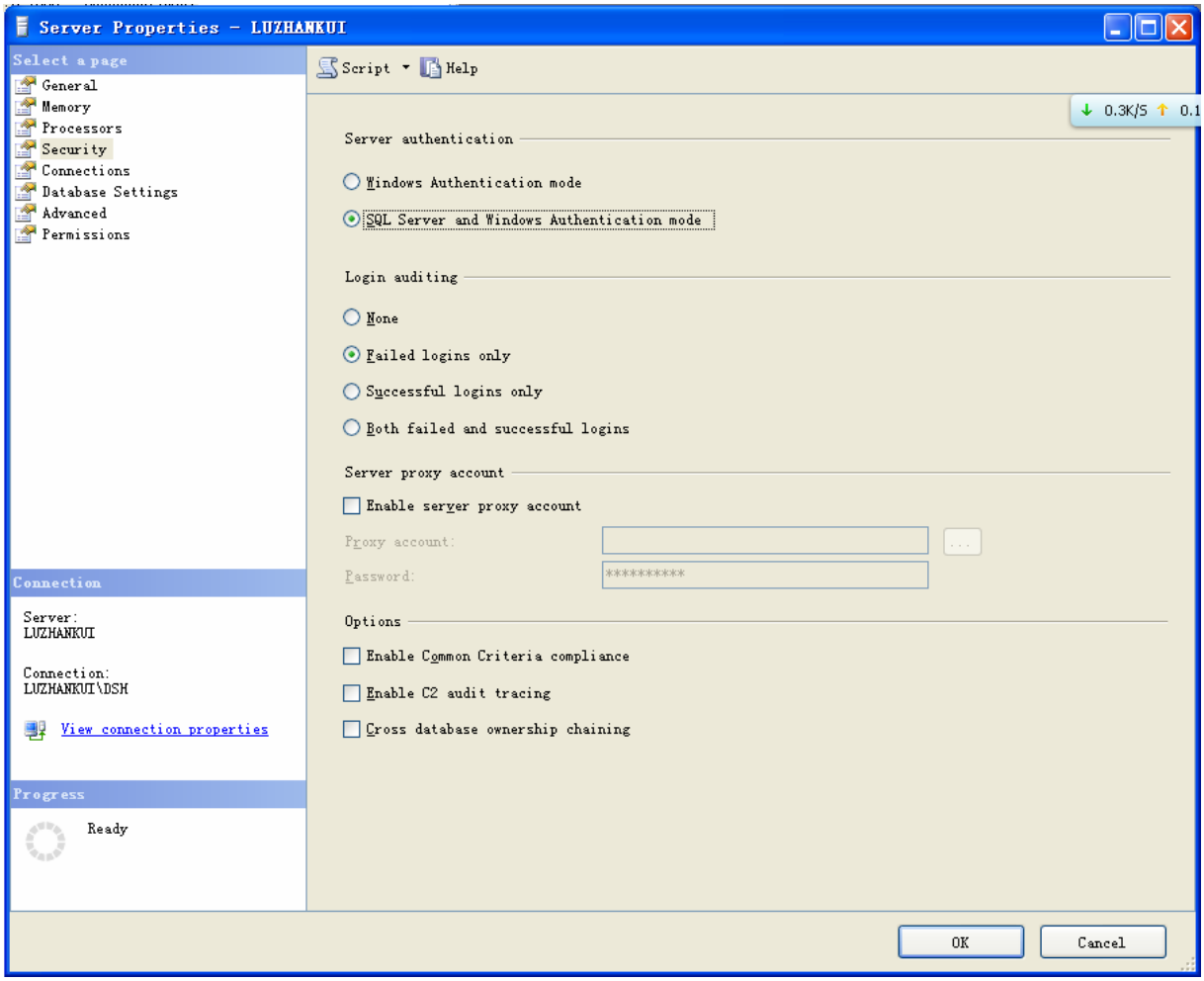
Set Authentication option as ‘Windows Authentication’. Later click **Connect** button.



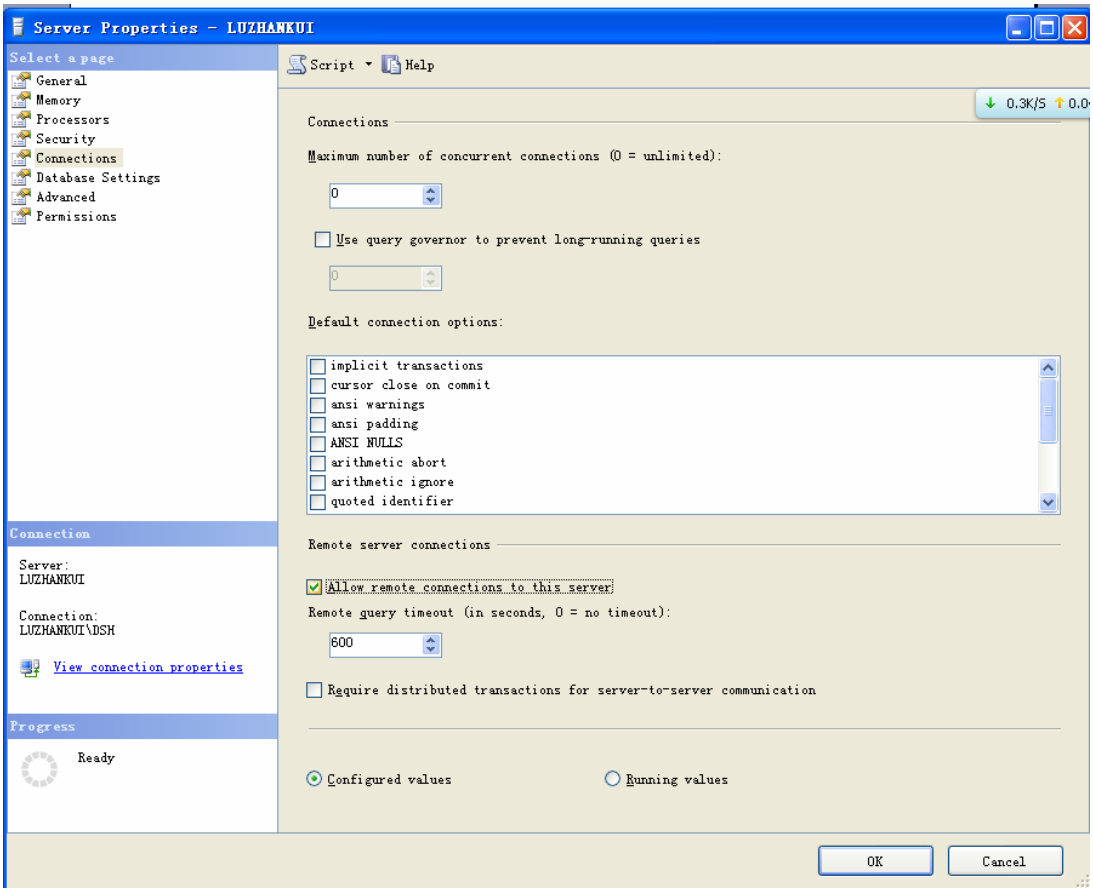
Select the menu item named ‘Properties’ as it is shown in the Figure above. Click it and the follow window will pop up:



Select the tree node name ‘Security’ on the left and check the button named ‘SQL Server and Windows Authentication’.

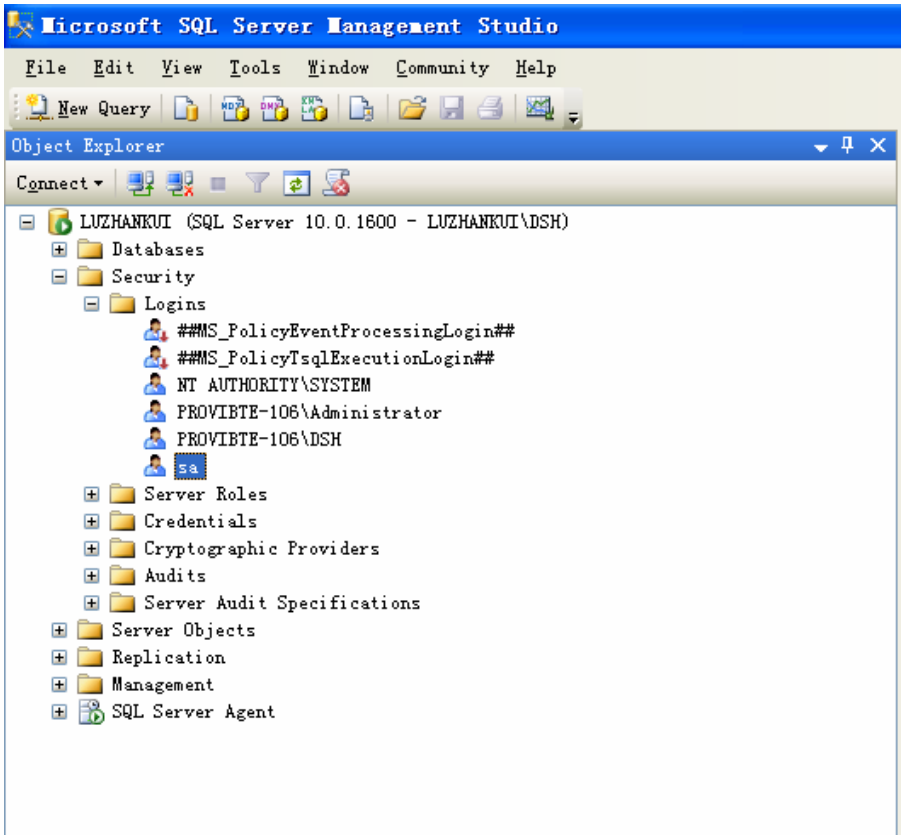


Select the tree node name ‘Connections’ on the left and check the button named allowing remote connections to this server’.



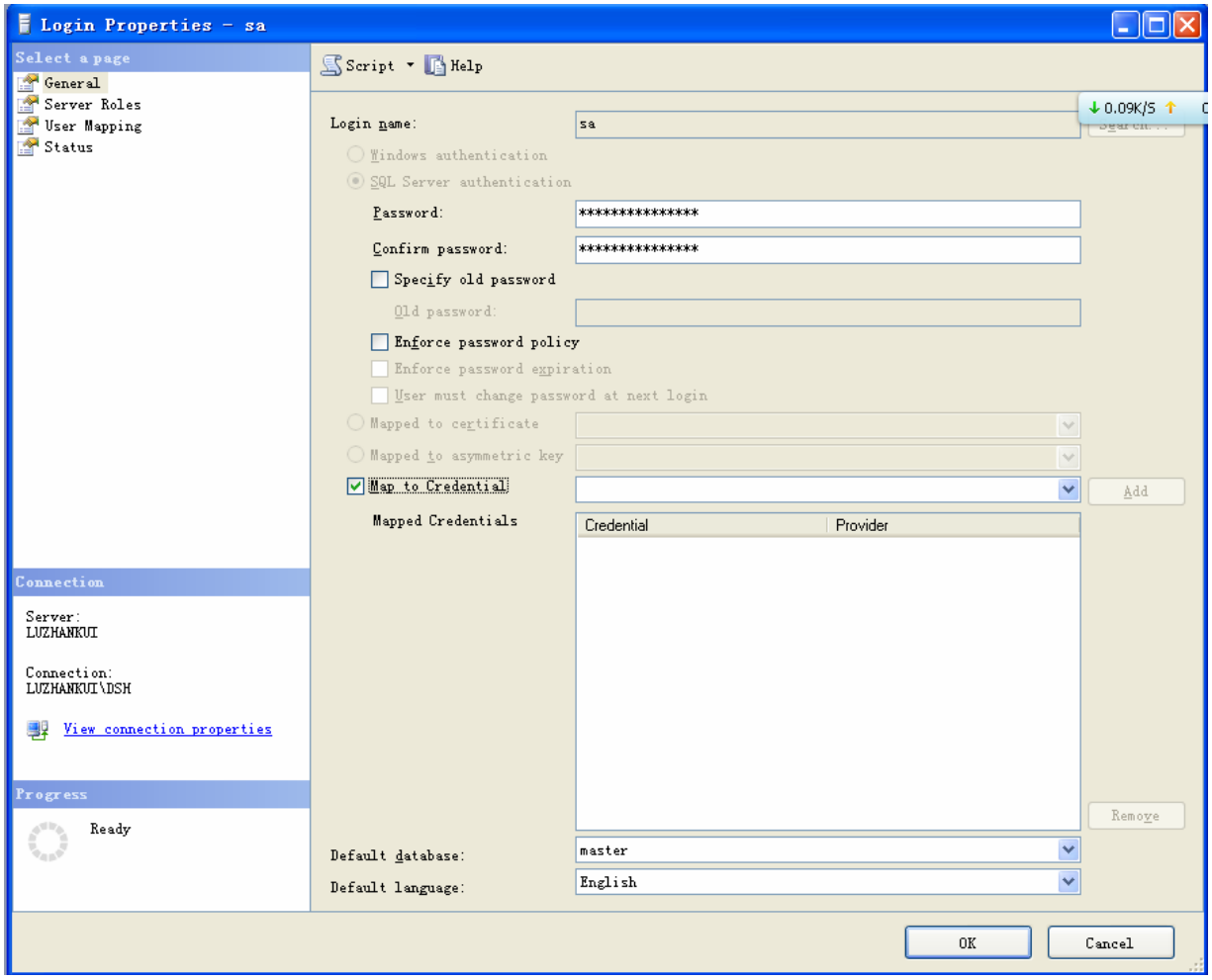
Click the button ‘OK’ and exit the window.。

Manage to find the account named ‘sa’ as follows.

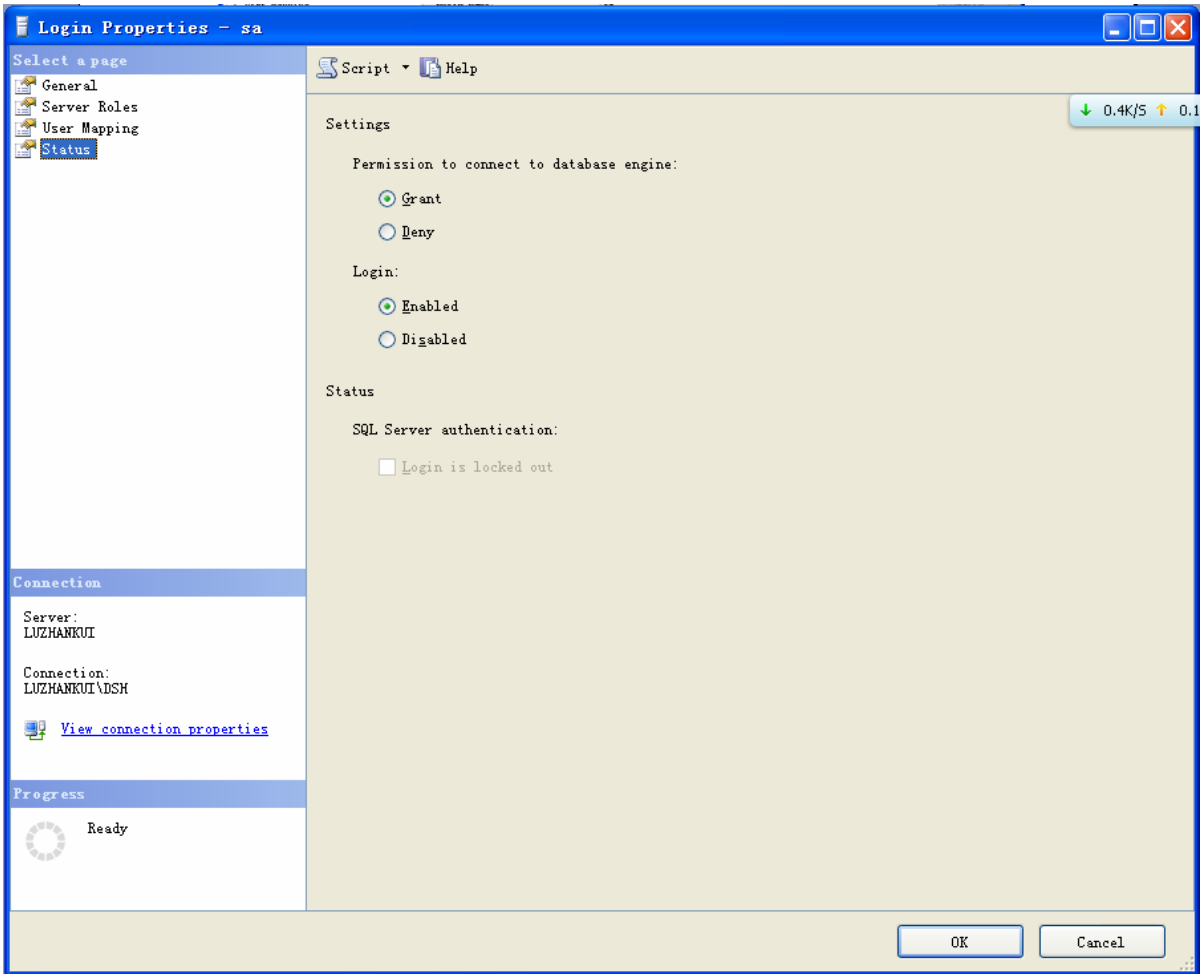


Right click on the node named ‘sa’ to open the ‘Properties’ window.

Click on the node named ‘General’ and check the button ‘Map to Credentials’.



Click on the node named ‘Status’ on the left and set all the status of the popup window as follow.



SQL Server Login Setting

Select Windows **Start**->**All Programs**->**Microsoft SQL Server 2008**->**SQL Server Management Studio**.

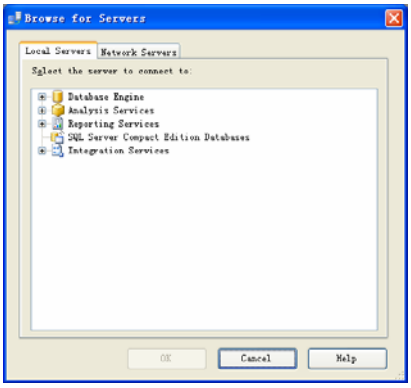
Then “Connect to Server” window is launched. Set **Server type** option as “Database Engine”.



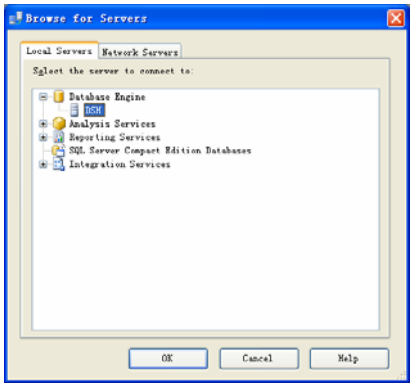
If the Server name option is blank, you should select “Browse for more…” from the list.



Then following window is launched.



Select “Local Servers” and open “Database Engine” node, and then select the server name, for example:”DSH”.



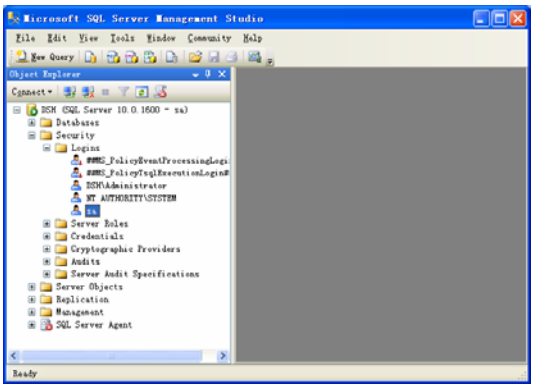
Later click **OK** button to return to “Connect to Server” window.



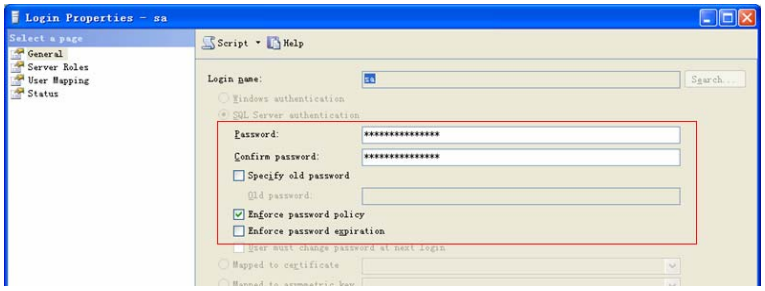
Set Authentication option as “SQL Server Authentication”. Type “sa” in Login edit box and type logon password of Windows Administrator account in Password edit box. Later click **Connect** button.



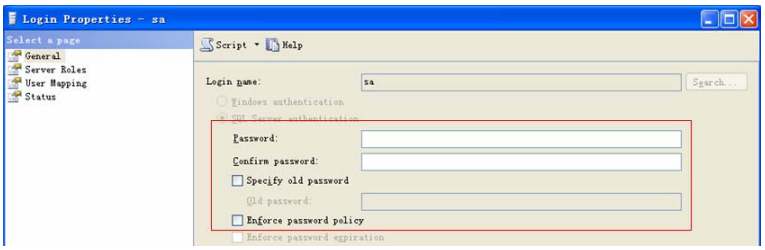
If succeeded in connecting to the server, the “Microsoft SQL Server Management Studio” window will be launched.



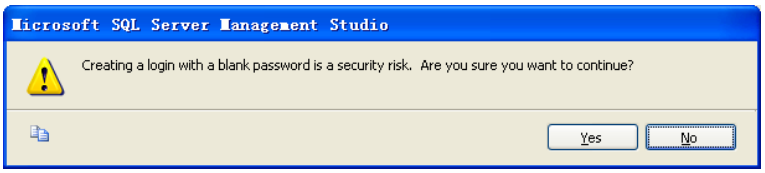
From the tree view above, select **DSH** (the server name you selected), **Security**, **Logins** and double click **sa**.



Click “Enforce password policy” to make it unchecked. And empty “Password” and “Confirm Password” to leave the “sa” password blank. Later click **OK** button.



Click **Yes** button in window below.

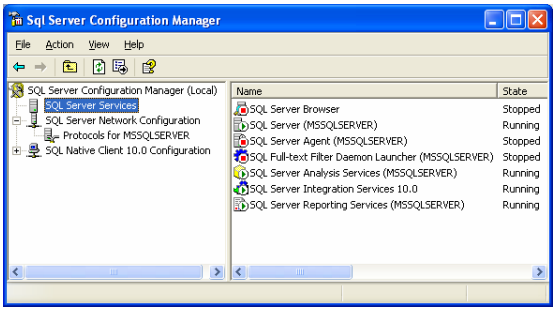

Microsoft SQL Server Management Studio
Creating a login with a blank password is a security risk. Are you sure you want to continue?
Yes
No

Note that the login password of “sa” should be set as blank; otherwise PCM360 system can’t connect to SQL Server.

Network Protocols Setting

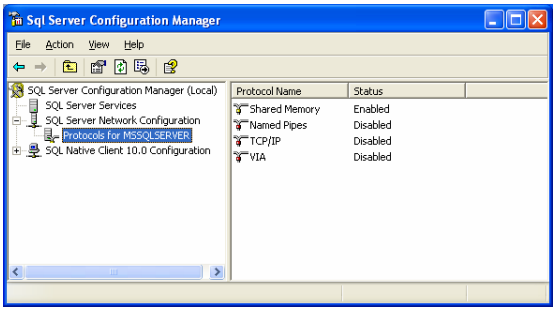
If the database is SQL Server Express, the key word ‘SQL Server(SQLEXPRESS) should take the place of the key word ‘SQL Server(MSSQLSERVER)'.

Select Windows **Start**->**All Programs**->**Microsoft SQL Server 2008**->**Configuration Tools**->**SQL Server Configuration Manager**. The “Sql Server Configuration Manager” window is launched.



Select **SQL Server Configuration Manager**->**SQL Server Services** from the tree view. Then stop **SQL Server (MSSQLSERVER)** service.

Select **SQL Server Network Configuration** from the left side tree view, and then select **Protocols for MSSQLSERVER** beneath this node.

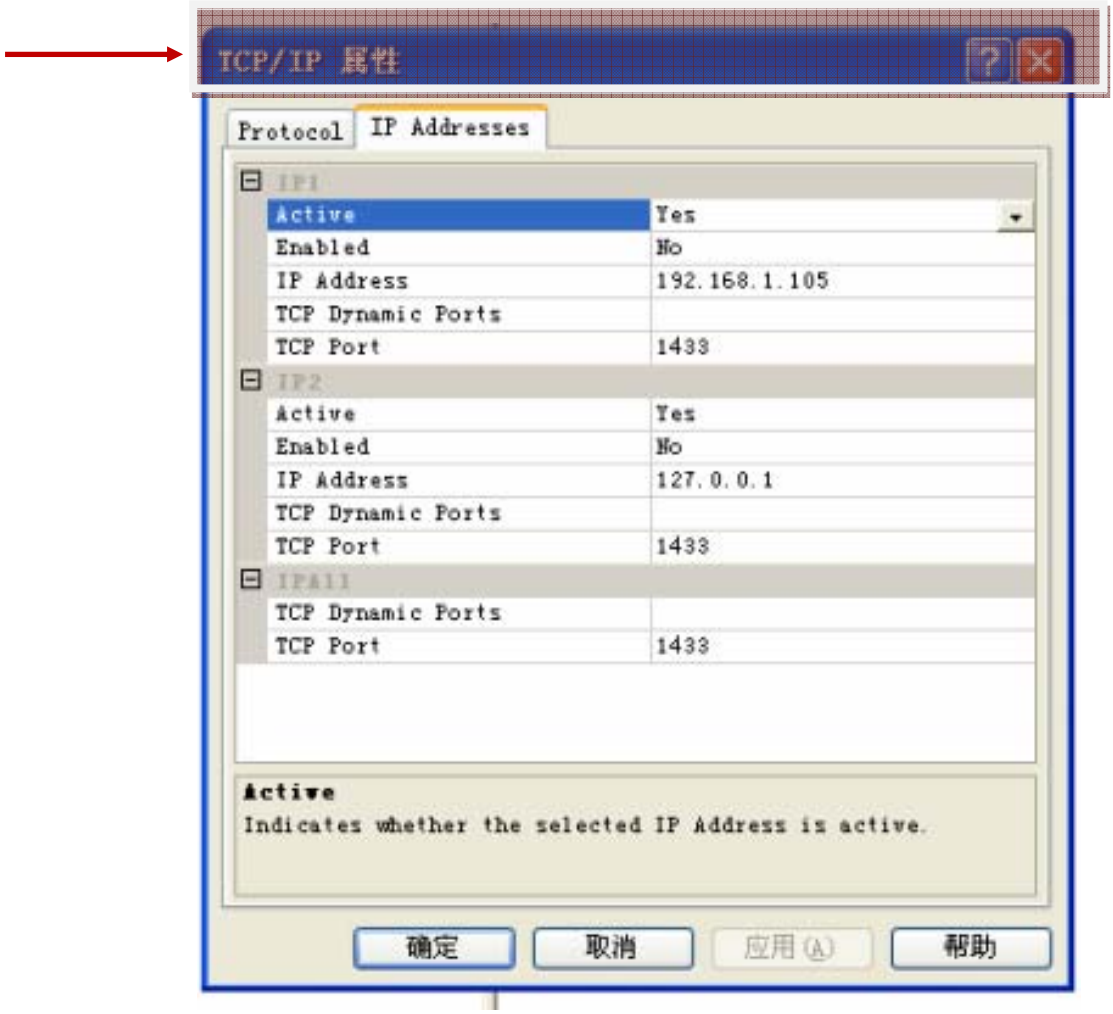


Right click “TCP/IP” and select “Enable” from shortcut menu. If the status of “TCP/IP” already shows “Enable”, you needn’t do the operation.

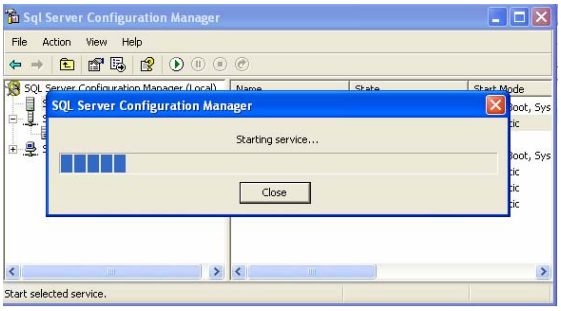


Click **OK** button.

If the database is SQL Server Express, the TCP port must be assigned manually .Double click the left button of the mouse on the item named 'TCP/IP', the TCP/IP propriety window will popup. Click the label named 'IP Address' on the top. Clear the contents of all the items with the name of 'TCP Dynamic Ports' and set the contents of all the items with the name of 'TCP Port as '1433'.



Re-select **SQL Server Configuration Manager->SQL Serve Services** from the tree view, and select **SQL Server (MSSQLSERVER)**. Right click **SQL Server (MSSQLSERVER)** and select **Start** from shortcut menu to start SQL Server service.

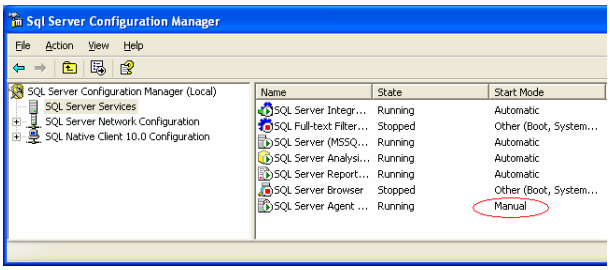


NOTE: To apply all configurations, you must re-start the computer.

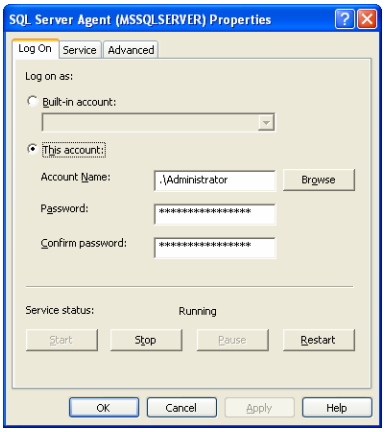
Start Mode Setting

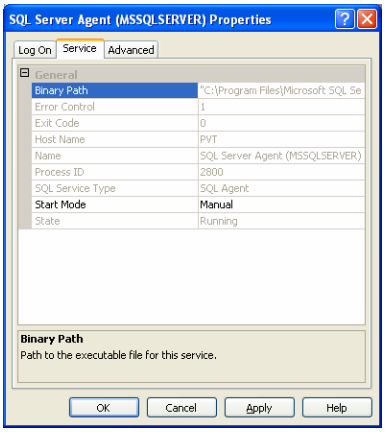
If the database is SQL Server Express, the agent function is disabled. Instead, start the service named 'SQL Server Browser' in a similar way as follows.

Set the start mode of "SQL Server Agent" to "Automatic". On "Sql Server Configuration Manager" window, select **SQL Server Services**. Currently, the SQL Server Agent's start mode is set as "Manual".

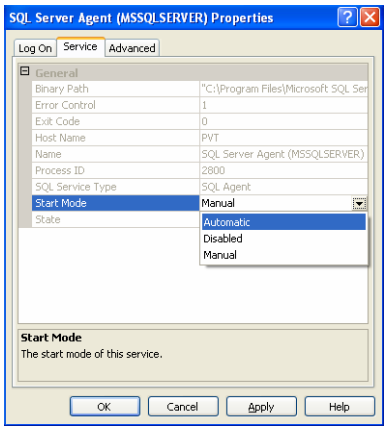

Sql Server Configuration Manager
File Action View Help
SQL Server Configuration Manager (Local)
SQL Server Services
SQL Server Network Configuration
SQL Native Client 10.0 Configuration
Name State Start Mode
SQL Server Integr... Running Automatic
SQL Full-text Filter... Stopped Other (Boot, System...
SQL Server (MSSQ... Running Automatic
SQL Server Analysi... Running Automatic
SQL Server Report... Running Automatic
SQL Server Browser Stopped Other (Boot, System...
SQL Server Agent ... Running Manual

Double click **SQL Server Agent** and the window below is launched. Select **Service** tab.





Set the "Start Mode" to "Automatic" and then click **OK** button.

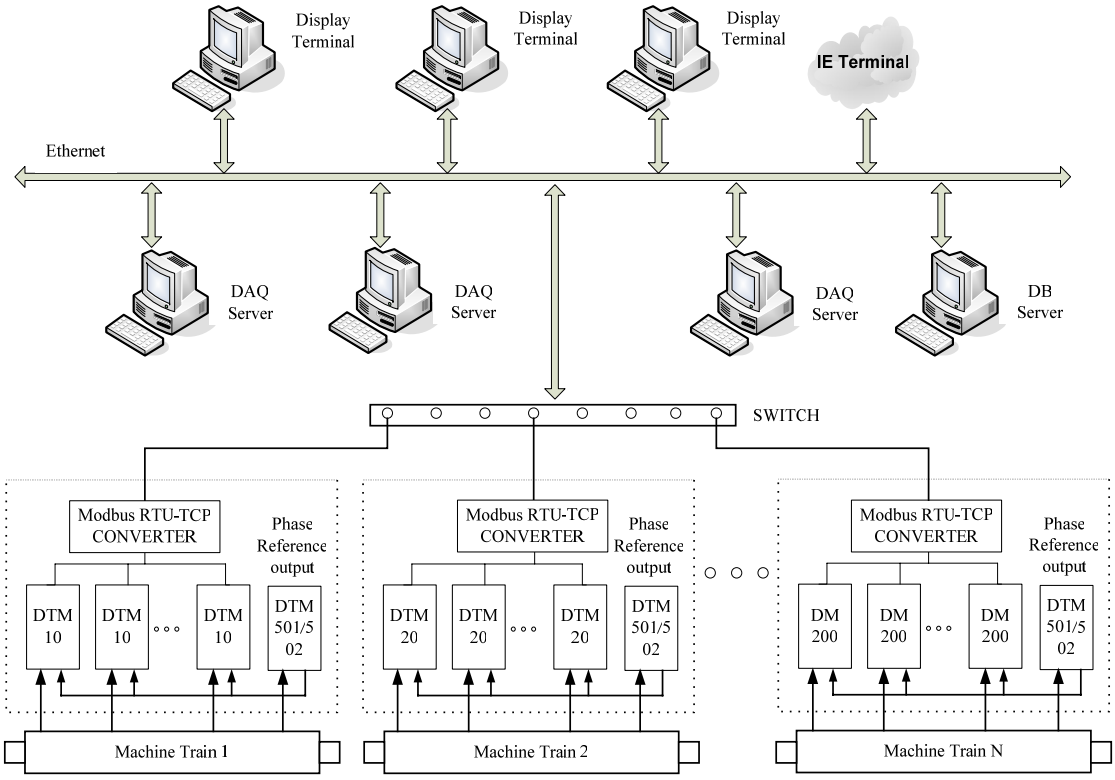


Now you have finished all the settings on MS SQL Server 2008.

NOTE: To apply all configurations, you must re-start the computer.

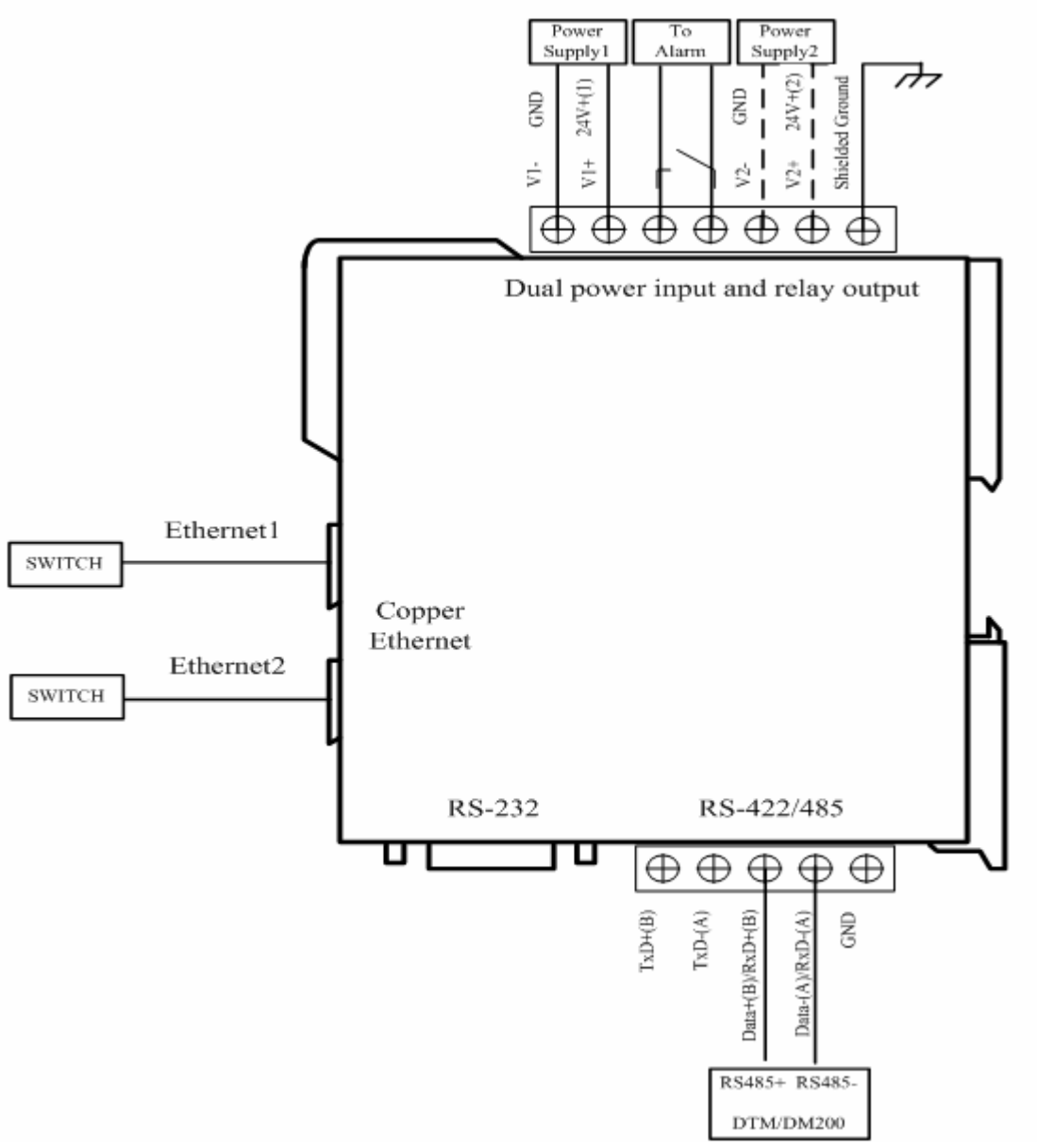
Modbus RTU-TCP Converter

System Layout Diagram Where the Converter Is Used



Modbus RTU-TCP Converter Field-Wiring Diagram

The converter is a 1-port advanced modbus gateways that converts between modbus TCP and modbus ASCII/RTU protocols. It can be used to allow Ethernet master to control serial slaves, or to allow master to control Ethernet slaves. Up to 31 serial slaves can be connected simultaneously.



Note:

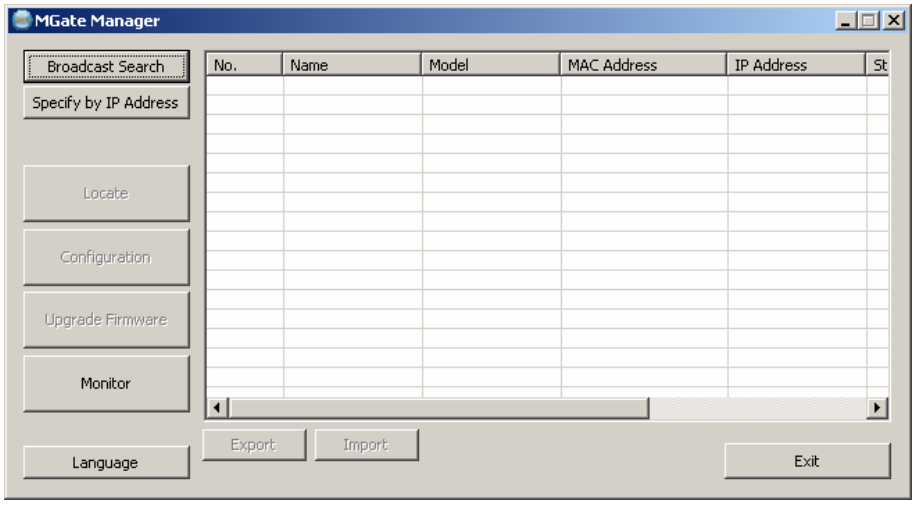
✓ Power Supply 2 is optional

Installing MGate Manager Software

Put the MGate Manager Installation Media into the DVD-ROM. Find “MGate Manager” folder and double click **MGM_Setup_Ver1.2_Build_07081514.exe**. Then follow the tips on the windows to install the software.

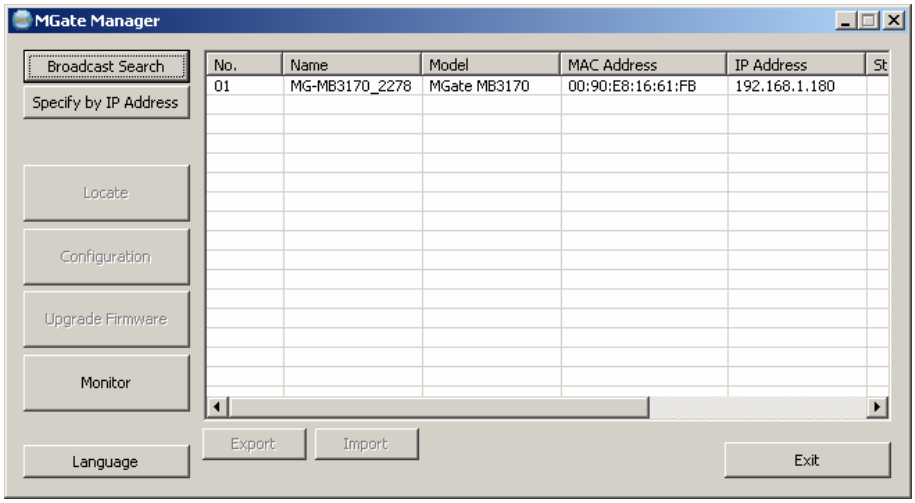
Configuring MGate Manager Software

To run MGate Manager Software, select Windows **Start**->**All Programs**->**MGate Manager**->**MGate Manager**. The software main window is launched.

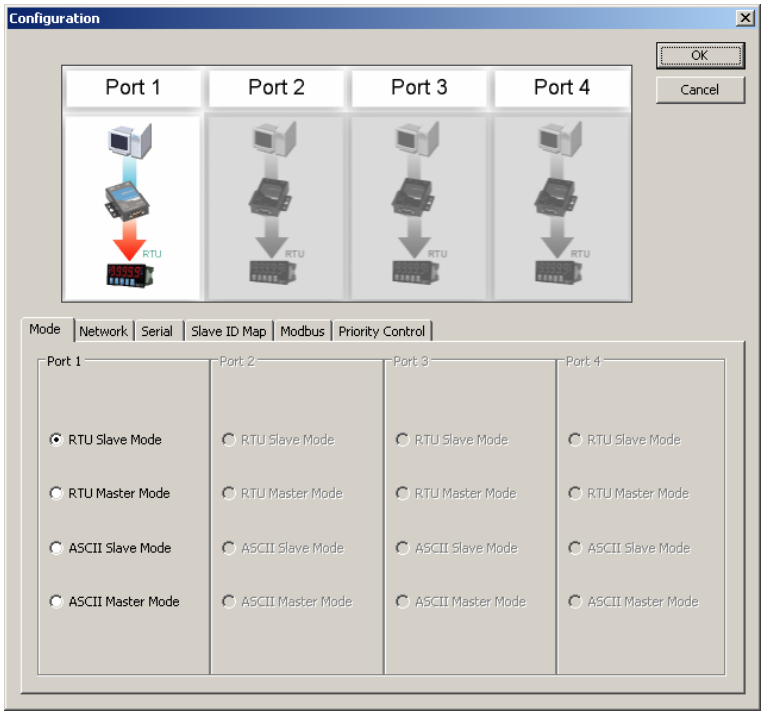


Before running the MGate Manager software, ***make sure the computer and Modbus RTU-TCP Converter are connected to the same network.*** For configuration purpose, the converter unit must be connected the available power source (Please refer to ***Modbus RTU-TCP Converter Field-Wiring Diagram***).

MGate Manager software should be connected with the unit before it can be configured. Click **Broadcast Search** button to find every converter on the LAN. When the search is complete, every converter that is found on the LAN will appear in the window with MAC Address and IP Address. Picture below indicates the condition that a converter was found.



Select the converter unit and then **Configuration** button is activated. Click this button to open “Configuration” window. See picture below.

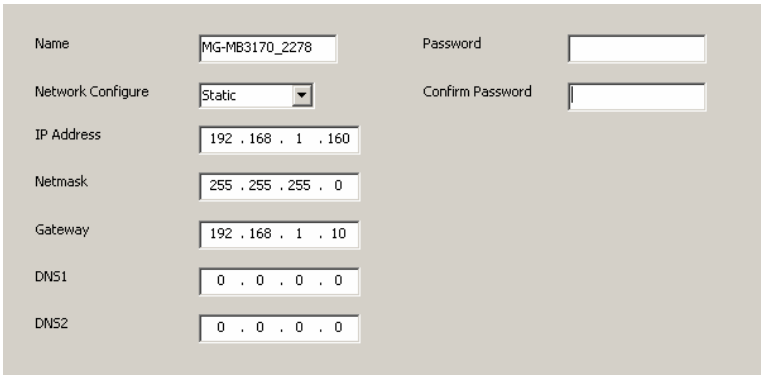


- ***Mode Tab***

On **Mode** tab, select “RTU Slave Mode” option.



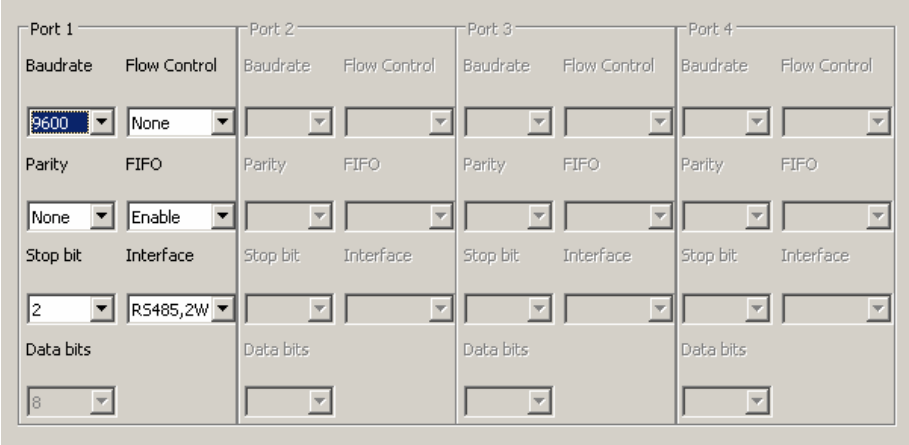
- ***Network Tab***



Parameters are set as follows:

- ✓ **Name:** You can enter a name to help you identify this unit.
- ✓ **Network Configure:** Select “Static” in this field.
- ✓ **IP Address:** Set a unique IP Address on the LAN. The default is “192.168.127.254”.
- ✓ **Netmask:** Set the same netmask address with the computer the unit currently connected to.
- ✓ **Gateway:** Set the same gateway address with the computer the unit currently connected to.
- ✓ **DNS1:** Set the same DNS1 address with the computer the unit currently connected to.
- ✓ **DNS2:** Set the same DNS2 address with the computer the unit currently connected to.
- ✓ **Password:** Leave this field blank.
- ✓ **Confirm Password:** Leave this field blank.

- ***Serial Tab***



Parameters are set as follows:

- ✓ **Baudrate, Parity, Stop bit:** The three communication parameters should match the communication parameters of DW devices that are connected to this unit.
- ✓ **Flow Control:** Select “None” in this field.
- ✓ **FIFO:** Select “Enable” in this field.
- ✓ **Interface:** Select “RS485 2W” or “RS485 4W” in this field.

- ***Slave ID Map Tab***

Use the default parameters setting on this tab.

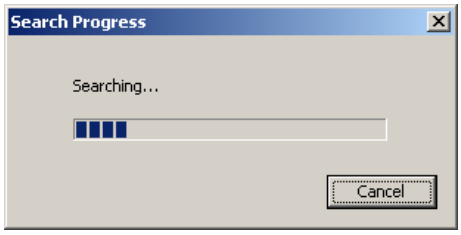
- ***Modbus Tab***

Use the default parameters setting on this tab.

- ***Priority Control Tab***

Use the default parameters setting on this tab.

After parameters on tabs above are configured, click **OK** button on “Configuration” window and following window is launched.



If parameters are successfully downloaded to converter unit, software will return to the main window.

PCM360 Software Installation

Installing DAQ Card Driver

There are an installation disks named DAQ Driver. Please follow the tips on the windows to install the software.

NOTES:

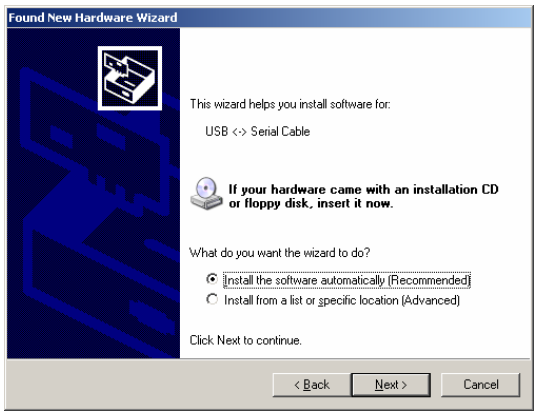
1. DAQ Card Driver must be installed on DAQ Servers that connect with the hardware DAQ card devices.
2. The DAQ cards that are installed on the same DAQ Server should have the same card type; otherwise DAQ cards can't function normally. For instance, DAQ6220 and DAQ6013 can't be installed on one DAQ Server.

Installing USB-RS485 or USB-RS232 Converter Driver

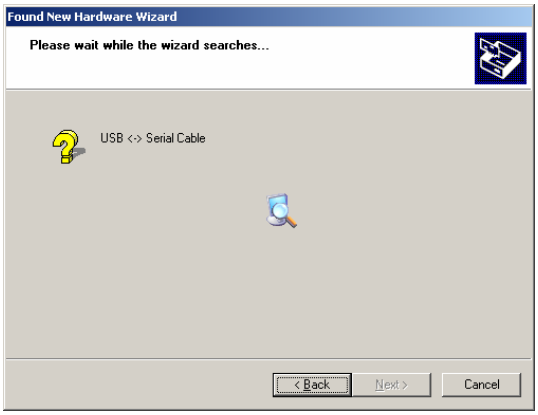
1. Connect USB-RS232 or USB-RS485 Converter to a spare USB port on your computer. Put the modbus installation media into DVD-ROM. The computer will launch the window below. Select "No, not this time" and click **Next** button.


Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

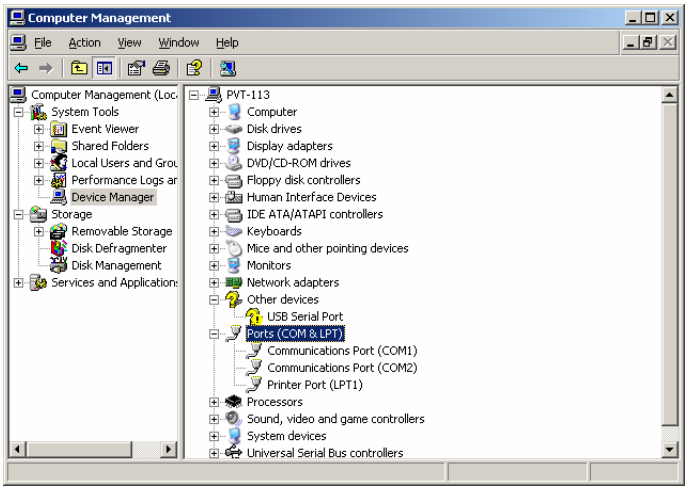
2. Select "Install the software automatically (Recommended)" and then click **Next** button.


Found New Hardware Wizard
This wizard helps you install software for:
USB <-> Serial Cable
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

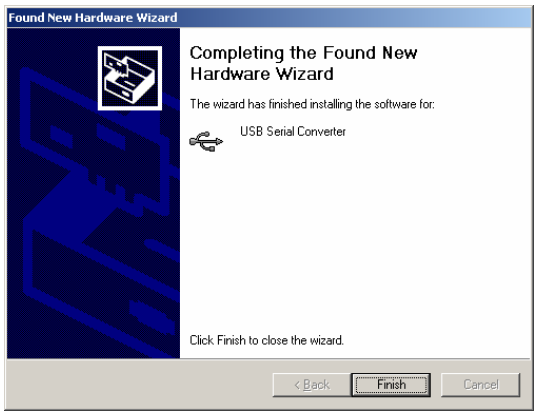
3. The computer now is beginning to scan the installation file and then install the USB-RS converter driver.



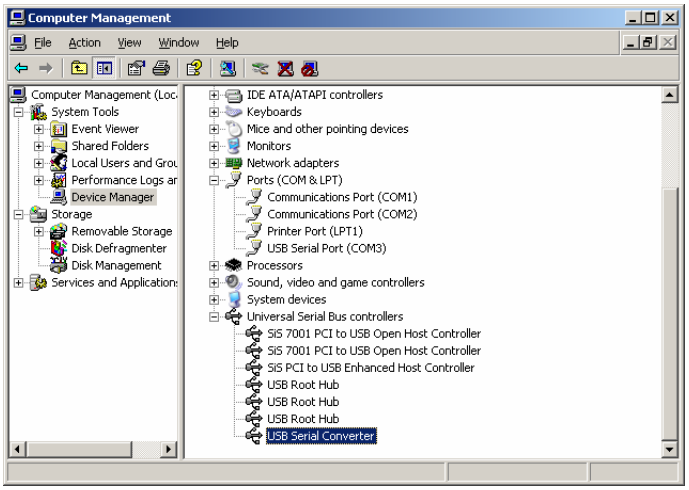
Picture below shows the condition that the USB-RS converter driver hasn't been installed. To view the information, right click **My Computer** and select **Manage** command. On "Computer Management" window, navigate to **Device Manager** and then select "Other devices/USB Serial Port".



4. The installation of USB-RS converter driver was finished. Click **Finish** button.

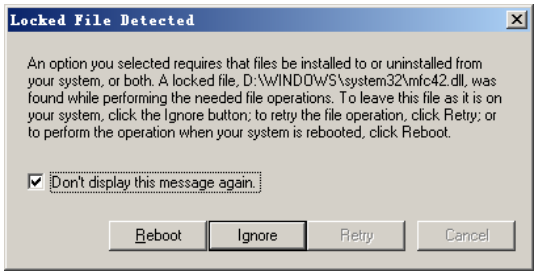


After the USB-RS converter driver was installed, the computer begins to install COM port. The installation process is the same as the installation of USB-RS converter driver, so we don't mention it here. After the two are installed, a new USB Serial Port "COM3" is added below "Ports (COM&LPT)" and "USB Serial Converter" is added below "Universal Serial Bus controllers". See picture below:



Installing PCM360 DAQ&COM Software

Put the DAQ&COM Installation Media into DVD-ROM. From the root folder, double click **Setup.exe** and then follow the tips on dialog windows to install the software. If "Locked File Detected" window is launched, you can mark "Don't display this message again" and click **Ignore** button to continue the installation.

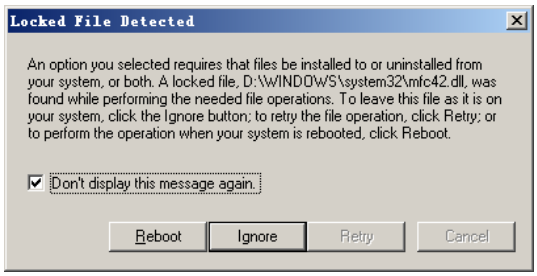

Locked File Detected
An option you selected requires that files be installed to or uninstalled from your system, or both. A locked file, D:\WINDOWS\system32\mfc42.dll, was found while performing the needed file operations. To leave this file as it is on your system, click the Ignore button; to retry the file operation, click Retry; or to perform the operation when your system is rebooted, click Reboot.
Don't display this message again.
Reboot
Ignore
Retry
Cancel

Installing PCM360 Display Software

CAUTION: The contents below only apply to Display Terminals that are not used as DB Server.

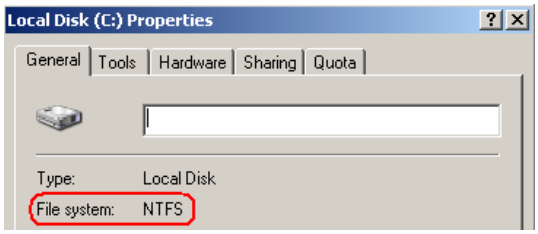
- If your Display Terminal runs on Windows 2000 operating system, Microsoft Data Access Components (MDAC.exe) 2.9.1 (or later version) should be installed.
- If your Display Terminal runs on Windows Vista operating system, please download the most recent version of Service Package from Microsoft Website to upgrade the operating system. For convenience, we supply SP1 for Windows Vista x86 Platforms and it is located in the folder "Windows vista x86 SP1" at the directory of "DBM&Server Installation/MS Update Pack".
- If your Display Terminal runs on Windows XP SP2 (or later version) operating system, there is no need to install MDAC 2.9.1 (or later version).

Put the Display Installation Media into DVD-ROM. From the root folder, double click **Setup.exe** and then follow the tips on dialog windows to install the software. If "Locked File Detected" window is launched, you can mark "Don't display this message again" and click **Ignore** button to continue the installation.

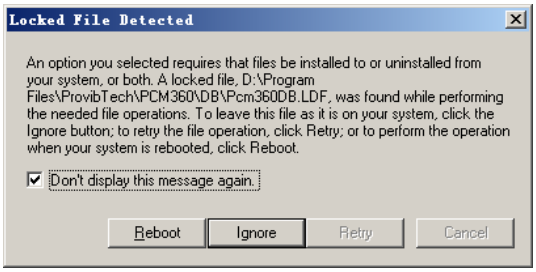

Locked File Detected
An option you selected requires that files be installed to or uninstalled from your system, or both. A locked file, D:\WINDOWS\system32\mfc42.dll, was found while performing the needed file operations. To leave this file as it is on your system, click the Ignore button; to retry the file operation, click Retry; or to perform the operation when your system is rebooted, click Reboot.
Don't display this message again.
Reboot
Ignore
Retry
Cancel

Installing PCM360 DBM&Server Software

CAUTION: The "File system" property of the disk in which the DBM&Server software's destination folder located must be "NTFS" format!



Put the DBM&Server Installation Media into DVD-ROM. From the root folder, double click **Setup.exe** and then follow the tips on dialog windows to install the software. If "Locked File Detected" window is launched, you can mark "Don't display this message again" and click **Ignore** button to continue the installation.


Locked File Detected
An option you selected requires that files be installed to or uninstalled from your system, or both. A locked file, D:\Program Files\ProvibTech\PCM360\DB\Pcm360DB.LDF, was found while performing the needed file operations. To leave this file as it is on your system, click the Ignore button; to retry the file operation, click Retry; or to perform the operation when your system is rebooted, click Reboot.
Don't display this message again.
Reboot
Ignore
Retry
Cancel

Installing PCM360 Web Server Software

CAUTION: Web Server software could be installed on any computer. Before installing it, ensure the Microsoft Internet Information Server (IIS) has been installed on the computer (To install it, please consult ***Appendix II. Installing Microsoft IIS***).

Put the Web Server Installation Media into DVD-ROM. From the root folder, double click **Setup.exe** and then follow the tips on dialog windows to install the software. If "Locked File Detected" window is launched, you can mark "Don't display this message again" and click **Ignore** button to continue the installation.

Installing PCM360 Modbus RTU

CAUTION: Modbus RTU should be installed on DAQ Server. Before installing it, ensure the DAQ&COM software has been installed on the DAQ Server.

Put the modbus Installation Media into DVD-ROM. From the root folder, open "Modbus RTU-Setup" folder. Double click **Setup.exe** and then follow the tips on dialog windows to install the software.

Installing PCM360 Modbus TCP Client

CAUTION: Modbus TCP Client should be installed on DAQ Server. Before installing it, ensure the DAQ&COM software has been installed on the DAQ Server.

Put the Modbus Installation Media into DVD-ROM. From the root folder, open "Modbus TCP Client-Setup" folder. Double click **Setup.exe** and then follow the tips on dialog windows to install the software.

Installing PCM360 OPC Client

CAUTION: OPC Client should be installed on DAQ Server. Before installing it, ensure the DAQ&COM software has been installed on the DAQ Server.

Put the OPC Installation Media into DVD-ROM. From the root folder, open “OPC Client-Setup” folder. Double click **Setup.exe** and then follow the tips on dialog windows to install the software.

Installing PCM360 Modbus TCP Server

CAUTION: Modbus TCP Server should be installed on DB Server. Before installing it, ensure the DBM&Server software has been installed on the DB Server.

Put the Modbus Installation Media into DVD-ROM. From the root folder, open “Modbus TCP Server-Setup” folder. Double click **Setup.exe** and then follow the tips on dialog windows to install the software.

Installing PCM360 OPC Server

CAUTION: OPC Server should be installed on DB Server. Before installing it, ensure the DBM&Server software has been installed on the DB Server.

Put the OPC Installation Media into DVD-ROM. From the root folder, open “OPC Server-Setup” folder. Double click **Setup.exe** and then follow the tips on dialog windows to install the software.

Installing PCM360 SMS

CAUTION: SMS should be installed on DB Server. Before instalingl it, ensure the DBM&Server software has been installed on the DB Server.

Put the SMS Installation Media into DVD-ROM. From the root folder, double click **Setup.exe** and then follow the tips on dialog windows to install the software.

Installing PCM360 Text Output

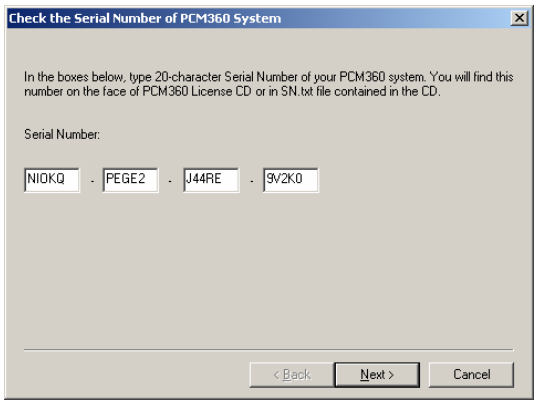
CAUTION: Text Output should be installed on DB Server. Before installing it, ensure the DBM&Server software has been installed on the DB Server.

Put the Text Output Installation Media into DVD-ROM. From the root folder, double click **Setup.exe** and then follow the tips on dialog windows to install the software.

License PCM360 System

CAUTION: To license PCM360 System, please install PCM360 License software on DB Server. Before installing License software, make sure MS SQL Server and DBM&Server software are installed, and the PCM360 database is attached to SQL Server (To attach the database, please consult ***PCM360 DBM SOFTWARE OPERATION/Attach the database to SQL Server*** of this manual).

1. Put the License Installation Media into DVD-ROM and double click **Setup.exe** to launch the "Check the Serial Number of PCM360 System" window.
2. Enter 20-character serial number. The serial number can be found on the PCM360 License Installation CD. And then click **Next** button.


Check the Serial Number of PCM360 System
In the boxes below, type 20-character Serial Number of your PCM360 system. You will find this number on the face of PCM360 License CD or in SN.txt file contained in the CD.
Serial Number:
NIOKQ
PEGE2
J44RE
9V2K0
< Back
Next >
Cancel

3. If the license succeeds, a message box will appear. Click **OK** button.

PCM360 Software Uninstallation

Uninstalling PCM360 DAQ&COM Software

Exit PCM360 DAQ&COM software first. Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**Uninstall**->**Uninstall DAQ&COM**.

CAUTION: If uninstalling DAQ&COM software, all devices (contain DAQ cards, Modbus RTU, Modbus TCP Client, OPC Client) on local DAQ Server will be removed.

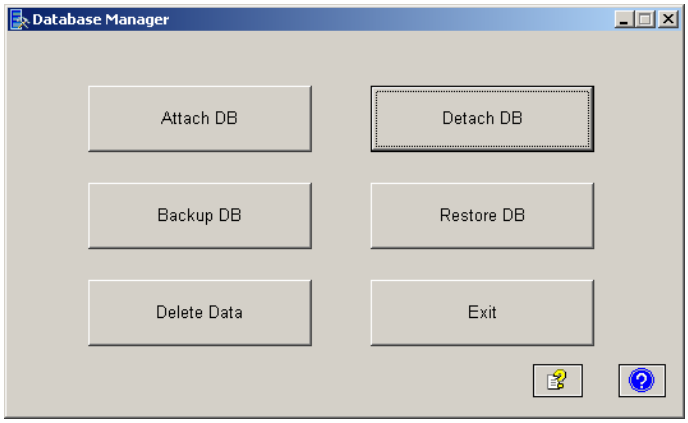
Uninstalling PCM360 Display Software

Exit PCM360 Display software first. Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**Uninstall**->**Uninstall Display**.

Uninstalling PCM360 DBM&Server Software

Before uninstall DBM&Server, please execute the following first:

1. Exit PCM360 software (DAQ&COM, Display, Server, and Web Server) on the DB Server.
2. Detach PCM360 database from SQL Server: Run PCM360 DBM software and click **Detach DB** button on main window. See picture below:



Then exit PCM360 DBM software. Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**Uninstall**->**Uninstall DBM&Server**.

CAUTION: If uninstalling DBM&Server software, all PCM360 services (contain Modbus TCP Server, OPC Server, SMS, Text Output) will be removed.

Uninstalling PCM360 Web Server Software

Exit PCM360 Web Server software first. Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**Uninstall**->**Uninstall Web Server**.

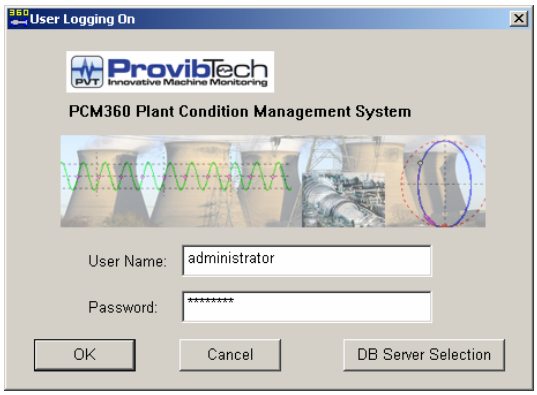
PCM360 DAQ&COM Software Operation

DAQ&COM software is an important part of PCM360 system, it mainly has two functions:

1. Collect real-time data and status of monitored machine train. The software supports multiple data acquisition interfaces: 4~20mA and voltage signal input, continuous vibration signal from transducers, process data from Modbus digital meters, dynamic waveform data from DW devices, and buffer output from ours or the third-party monitors;
2. Configure the entire system, for example: add and set DAQ devices, set the channels parameters, calibrate DAQ channels, add plants (machine trains, machines, and measurement points) monitored by the system, etc.

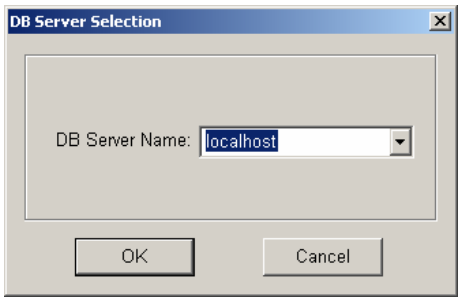
Run PCM360 DAQ&COM Software

Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**PCM360 DAQ&COM** command. On "User Logging On" window, type the user name (default is "administrator") and password (default is "password"). And then click **OK** button to log on.



DB Server Selection (Button)

Click this button to change the DB Server PCM360 DAQ&COM software connects to.

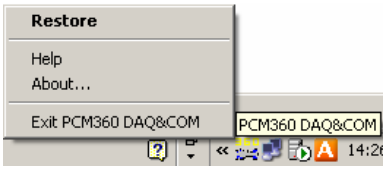


Type the name or IP address of DB Server, and click **OK** button.

PCM360 DAQ&COM Tray

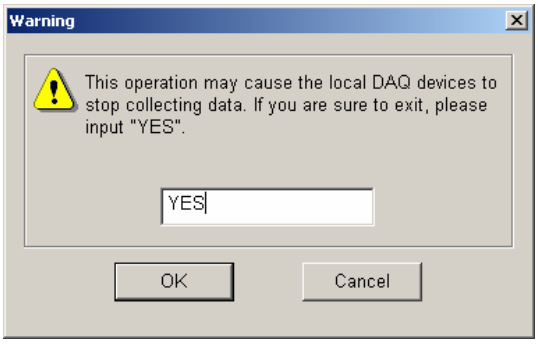
PCM360 DAQ&COM software is a taskbar application and follows the standard behavior of taskbar applications. When minimized, its shortcut icon appears in the area of the taskbar clock on the right of the taskbar.

- ✓ To normally display the software, double click the task icon.
- ✓ To get the task shortcut menu, right click the task icon. See picture below.



Restore: Select this command to normally display PCM360 DAQ&COM software. It does the same work with double clicking the task icon.

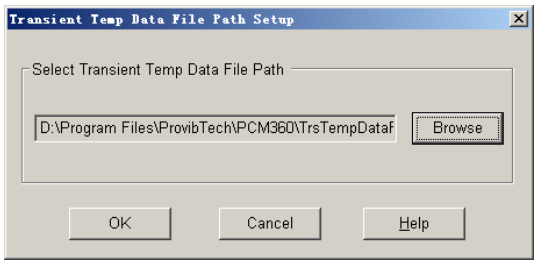
Exit PCM360 DAQ&COM: Select this command and a "Warning" window is launched. To exit the software, Type "YES" and then click **OK** button.


Warning
This operation may cause the local DAQ devices to stop collecting data. If you are sure to exit, please input "YES".
YES
OK
Cancel

Note that when PCM360 DAQ&COM software is normally displayed, clicking the **close** button on the window does not terminate the application (but minimizes it to the taskbar).

File Menu

Transient Temp Data File Path Setup



Transient Temp Data File is a temporary file that stores the latest collected transient data. These transient data will be stored as “TrsCollectDevice_0.dat” format.

After PCM360 DAQ&COM installing and first run, it will automatically specify a default path to save the transient temporary file. User can click **Browse** button to select another path, and PCM360 DAQ&COM software will create a folder “TrsTempDataFilesPath” under the selected path. Then the transient temporary file will be saved in “Selected path\TrsTempDataFilesPath”. For example, if you select a path: “D:\Program Files\ProvibTech\PCM360”, the path in which transient temporary data is stored is: “D:\Program Files\ProvibTech\PCM360\TrsTempDataFilesPath”.

OK (Button): Save the path setting before closing the window.

Cancel (Button): Close the window without saving any changes on this window.

Help (Button): Click this button to view help files.

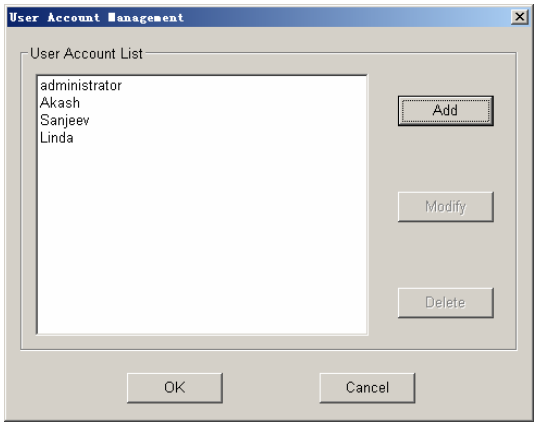
Close

Clicking this command doesn’t exit the software but minimizes the software to the taskbar.

User Menu

User Account Management

The function is used to manage user account information, and only administrator has right to execute this function.

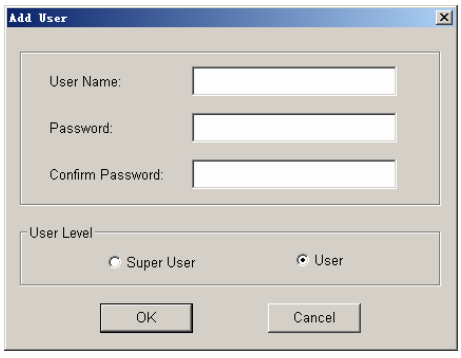


NOTE: PCM360 system provides three levels of user access: administrator, Super user, and User.

- **administrator:** It is the highest level of user access and has full access to operate PCM360 system. User with this right must be well trained and be knowledgeable of this field. Operation of deleting administrator is not allowed.
- **Super User:** User with this right almost has full access to operate PCM360 system, but it can't manage user accounts information, calibrate DAQ channels, set PCM360 services properties and maintain system database. User with Super User rights also should be well trained and be knowledgeable about the operation of the software.
- **User:** It is the lowest level of user access. User with this right only has access to define PCM Explorer and view plots.

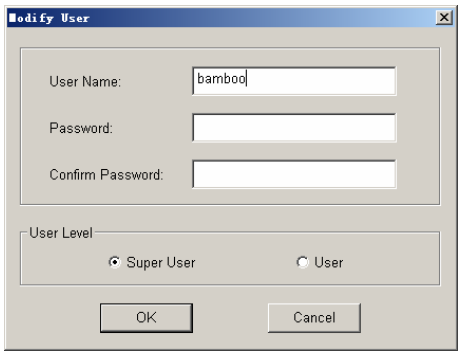
Add (Button)

Click **Add** button to launch "Add User" window. Enter user name, password, confirm password, and select user level, and later click **OK** button.



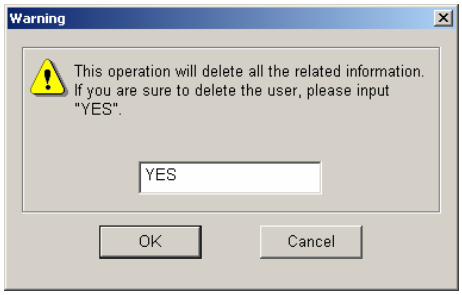
Modify (Button)

Select a user (not administrator) from “User Account” List and click **Modify** button. You can change user name, password, and user level.



Delete (Button)

Select a user (not administrator) from “User Account” list and then click **Delete** button. This operation will delete all information that relates to this user. Type “YES” in edit box and click **OK** button on warning window.



OK (Button)

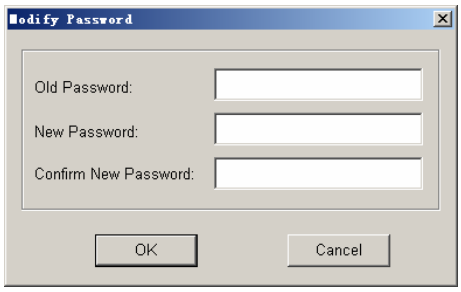
Click this button to save all settings before close the window.

Cancel (Button)

Click this button to close the window without saving the settings on this window.

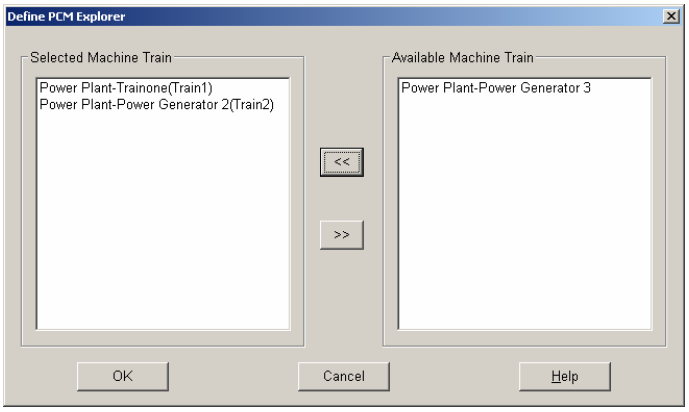
Modify Password

Select **Modify Password** from **User** menu to launch “Modify Password” window. Type the old password, new password (twice) and then click **OK** button.



Define PCM Explorer

Ensure DAQ module on local computer is started. Select **Define PCM Explorer** from **User** menu.



Selected Machine Train (List): List machine trains that are displayed on PCM Explorer of the current logged on user.

Available Machine Train (List): List machine trains that are monitored by PCM360 system but not displayed on PCM Explorer of current logon user.

<< **:** Left shift button.

>> **:** Right shift button.

The PCM Explorer is empty when you first log on PCM360 DAQ&COM. After finished the system configuration, you should add the concerned machine trains on the PCM Explorer by moving them from “Available Machine Train” list to “Selected Machine Train” list.

NOTES:

1. Name Display

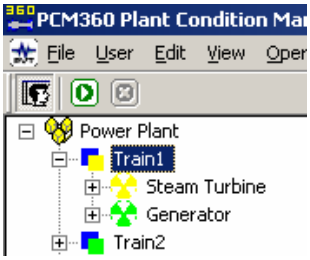
In “Selected Machine Train” list, machine trains are described by following format:

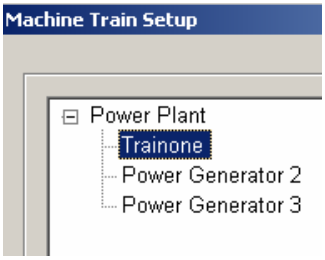
Power Plant-Trainone(Train1)

Plant Name-Machine train name in system (Machine train name on PCM Explorer of current user)

The first name from left is plant name plus train name in PCM360 system, and the second name is train name displayed on PCM Explorer of current user.

Example: Machine train name on PCM Explorer of current user is: **"Train1"**, and the Machine train name in system is: **"TrainOne"**.





2. Display a new machine train, machine or measurement point on PCM Explorer.

After adding a new machine train, machine, or measurement point in system, user should display it on PCM Explorer. If a new machine train is added, directly move it from "Available Machine Train" list to "Selected Machine Train" list; and if the new machine or new measurement point is added, please follow the steps below:

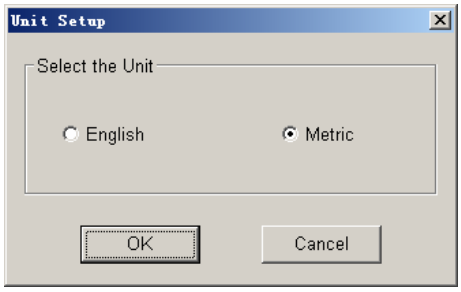
1) Open "Define PCM Explorer" window, and move the machine train that contains the new item to "Available Machine Train" list, and later click **OK** button to exit the window.
2) Open "Define PCM Explorer" window again, and then move the same machine train to "Selected Machine Train" list, and finally click **OK** button to exit the window.

Refresh PCM Explorer

Click this command to refresh PCM Explorer. Note that to refresh the explorer, make sure the DAQ module on local DAQ Server is started.

Unit Setup

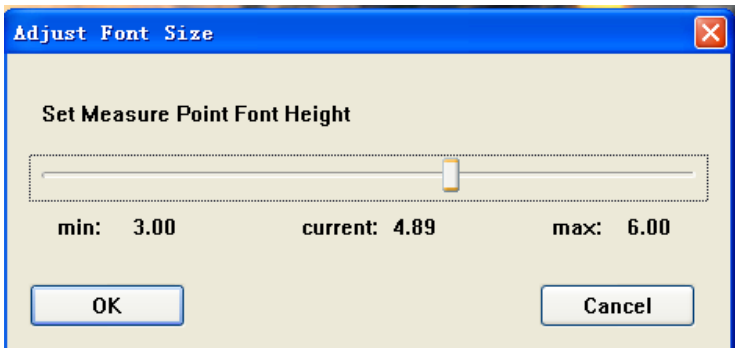
This command is used to set unit for the collected data on DAQ module. (Note that the configuration of the PCM360 should be in the same units in Metric/English, as selected for the display on the screen).



Select “English” or “Metric”, and then click **OK** button.

Change the size of the font of the measurement points

Select **Measure Point Font...** command from **User** menu, the dialog for adjusting the size of the font of the measurement points will pop up as follow:



Drag the slider and release, click the button OK, the size of the font of the measure points will change.

Edit Menu

Edit Picture

This command is used to set picture location of machine trains, machines, and measurement points on PCM Explorer window. After you finished configuring plants, machine trains, machines, and measurement points, you should select **Define PCM Explorer** from **User** menu (ensure the DAQ module on local DAQ Server is started) to display the related trains on PCM Explorer.

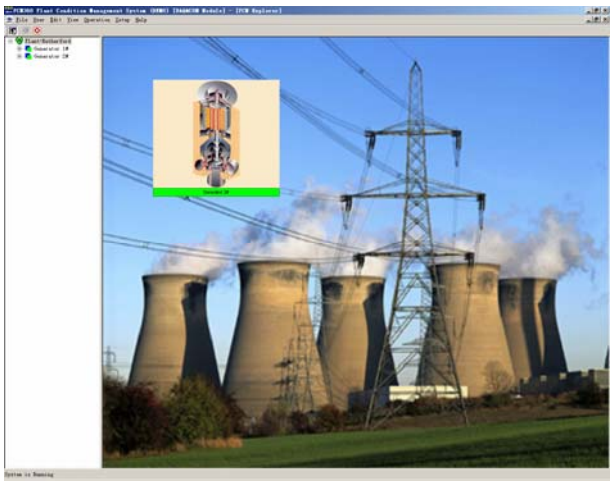
Example: The next lines guide you through the steps to configure **Plant-Machine train view**, **Machine train-Machine view** and **Machine train-Machine-Measurement point view**. Following table shows you the relationship between the plant, machine train, machine, and measurement point. This is only an example.

Plant	Machine Train	Machine	Measurement point
Plant-Rutherford	Generator1#	Gear1#	ACC

Plant-Rutherford	Generator1#	Gear1#	VIB
Plant-Rutherford	Generator1#	Gear2#	VEL
Plant-Rutherford	Generator1#	Gear2#	OTH
Plant-Rutherford	Generator2#	Gear3#	Acc
Plant-Rutherford	Generator2#	Gear3#	Vib
Plant-Rutherford	Generator2#	Gear4#	Vel
Plant-Rutherford	Generator2#	Gear4#	Oth

- **Configure Plant-Machine train view**

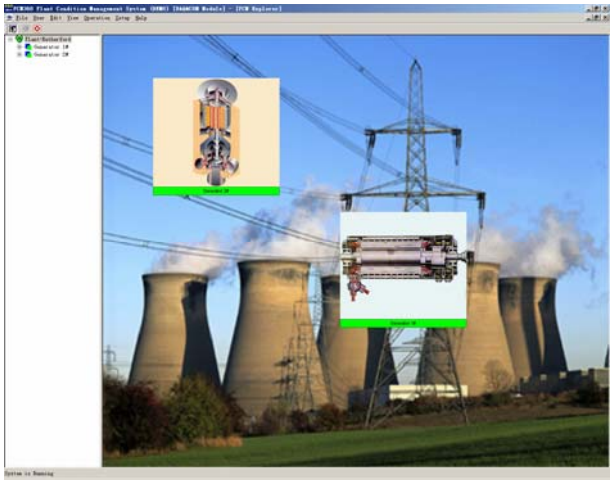
1. Select Plant-Rutherford from tree view. See current PCM Explorer:



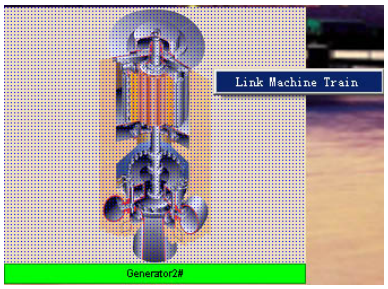
2. Select **Edit Picture** from **Edit** menu to make it checked;



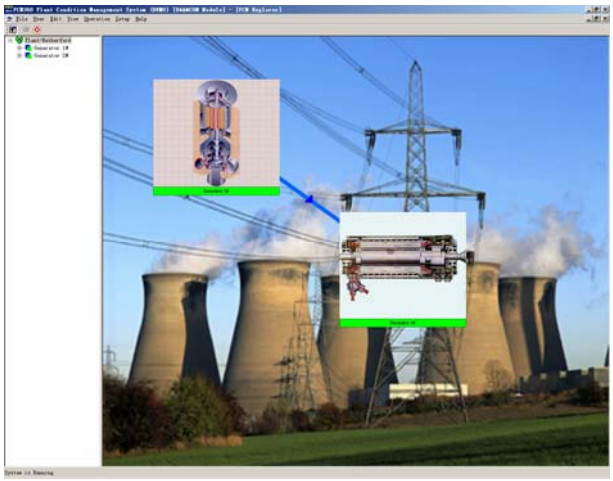
3. Drag machine train pictures and move them to proper location on plant picture;



4. Right click the picture of machine train Generator 2#, and select **Link Machine Train** command;

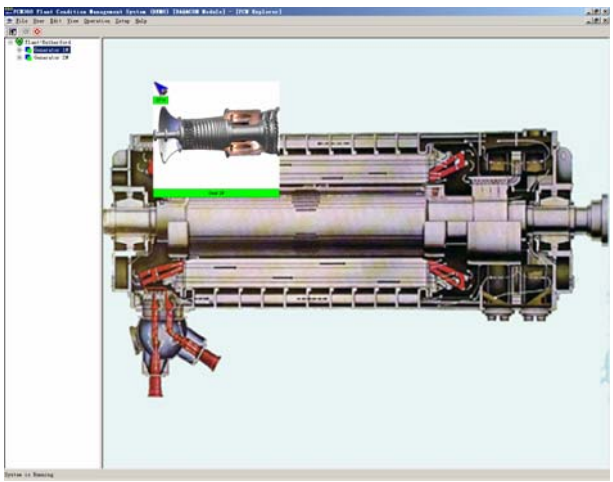


And click anywhere on the picture of Generator 1#. See picture below: a line that starts with picture of Generator 2# and ends with Generator 1# is displayed.

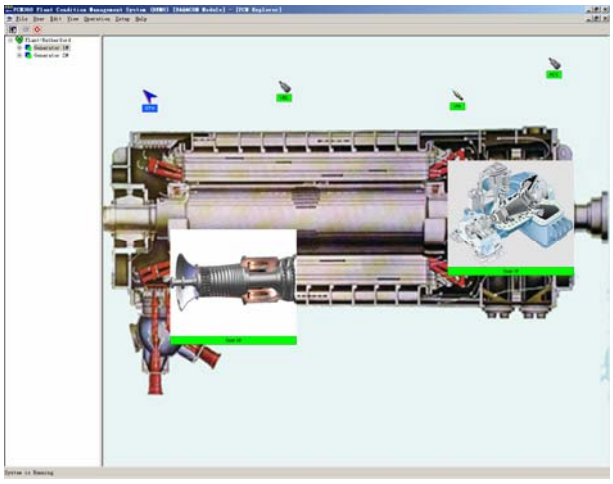


- **Configure Machine train-Machine-Measurement point view**

1. Select Generator1# from tree view (or double click picture of Generator1# on Graphics View). See Graphics View about Generator1#;



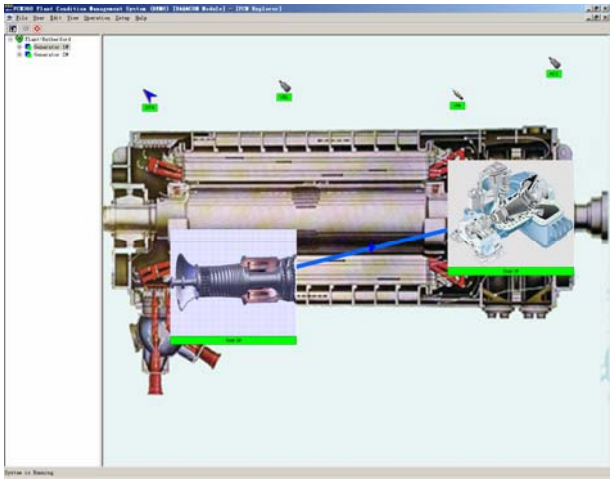
2. Drag pictures of machines and measurement points beneath Generator1# to the proper location. (Ensure **Edit Picture** from **Edit** menu is checked);



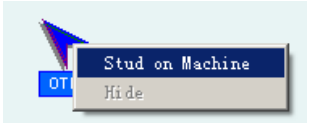
3. Right click picture of Gear 2# and select **Link Machine** command;



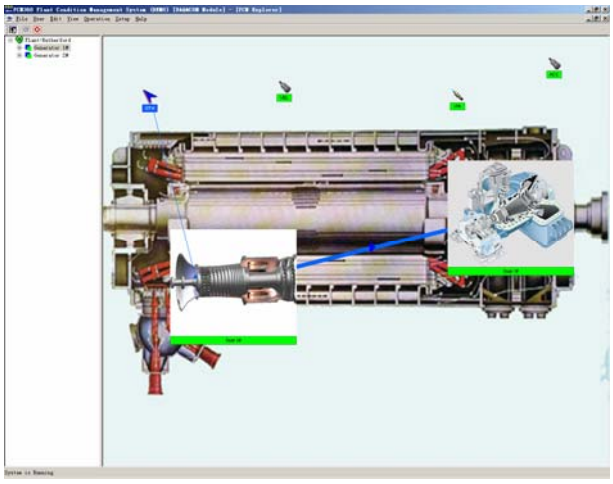
Click anywhere on picture of Gear 1#. See picture below: a line that starts with picture of Gear 2# and ends with Gear 1# is displayed;



4. Right click picture of measurement point OTH and then select **Stud on Machine** command;



Since OTH belongs to machine Gear 2#, click anywhere on picture of Gear 2#, and then OTH is fixed on Gear 2#. See picture below:



Repeat operations mentioned above to configure other **Machine train-Machine-Measurement point View**.

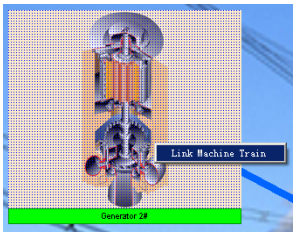
CAUTION: To apply all configurations on Graphics View, before the PCM Explorer is refreshed, you should select **Edit Picture** from **Edit** menu to make the command unchecked. Or else, the configuration information will be lost.

Other functions:

- ***Withdraw the linking between two machine trains and two machines***

Answer: Take Generator 1# and Generator 2# as an example. We have linked Generator 1# and Generator 2#. The line started with picture of Generator 2# and ended with picture of Generator 1#. Follow the steps below:

1. Select **Edit Picture** from **Edit** menu to make it checked. If the command is already checked, skip the step and directly go to step 2;
2. Right click picture of Generator 2# and select **Link Machine Train** command;



3. Click anywhere beyond picture of Generator 1#. After that, the line between pictures of Generator 2# and Generator 1# will disappear.

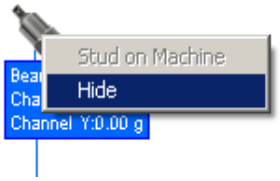
The method mentioned above also applies to withdraw lines between two machines.

- ***Hide or show measurement points on Machine Train-Machine-Measurement point View and Machine-Measurement point View***

Answer: Ensure **Edit Picture** from **Edit** menu is not checked. On the view, right click picture of machine, and then select **Show All Measurement Points** or **Hide All Measurement Points** command. After that, measurement points that belong to the machine are shown or hidden.

- ***Hide a single measurement point beneath the machine***

Answer: Ensure **Edit Picture** command from **Edit** menu is unmarked. On **Machine train-Machine View** or **Machine-Measurement point View**, right click this measurement point and select **Hide** command from shortcut menu.



- ***Zoom in or zoom out pictures of machine train and machine***

Answer: Take picture of machine Gear 2# as an example. Ensure that **Edit Picture** from **Edit** menu is marked. Rest the mouse pointer on the side edge of the picture, for example, on the right side. When the mouse pointer changes to a straight double-arrow, to zoom in picture of Gear 2#, you should drag the picture to the outside direction, in this example you should drag it to the right side. And to zoom out picture of Gear 2#, you should drag the picture to the inside direction, in this example you should drag it to the left side. Pictures of machine trains and machines can be zoomed in or zoomed out from 4 directions (up, down, left and right).

View Menu

Toolbar

Toolbar menu contains shortcut icons of some commands.

: Click this shortcut icon to hide or display PCM Explorer. This shortcut icon has the same function with **PCM Explorer** command from **View** menu.

: Click this shortcut icon to start DAQ module. With the DAQ module started, all devices on local DAQ Server will start to work. The shortcut icon has the same function with **Start DAQ** command from **Operation** menu.

: Click this shortcut icon to stop DAQ module. Once the DAQ module is stopped, all devices on local DAQ Server will stop working and you can configure the system. The shortcut icon has the same function with **Stop DAQ** command from **Operation** menu.

Status Bar

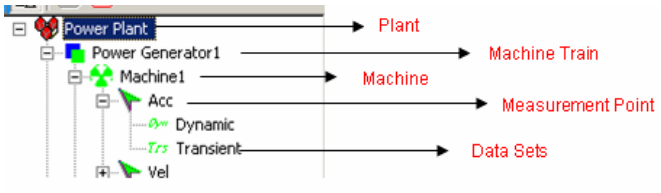
Activate or deactivate the status bar displaying at the bottom of the screen. This display usually contains additional information about the function or feature the mouse pointer is resting on.

PCM Explorer

Use this command to hide or display PCM Explorer. The PCM Explorer of PCM360 system mainly consists of two parts: **Tree View** and **Graphics View**.

Tree View

The route of tree view is configured for five hierarchy layers: plants, machine trains, machines, measurement points, and data sets. Refer to picture below:



On tree view, colors of the measurement point, machine, machine train and plant indicate the alarm severity of the latest collected sample under them. Following table gives you the description of different colors.

Color	Description
Red	The latest collected sample under the related measurement point is a “danger” data. In this condition, colors of machine, machine train, and plant that are associated with this measurement point will show red.
Yellow	The latest collected sample under the related measurement point is an “alert” data. For machine, machine train, and plant, if the color shows yellow that indicates there is no “danger” data among all the latest collected samples under this machine, machine train and plant. Meanwhile at least

	one latest collected sample is an “alert” data.
Green	The latest collected sample under the related measurement point is a “normal” data. For machine, machine train, and plant, if the color shows green that indicates all the latest collected samples under this machine, machine train and plant are “normal” data.

Date Sets Introduction:

DAQ module could collect three types of data: static data, dynamic data and transient data. From tree view, you may see nodes **Static**, **Dynamic** and **Transient**. The three data types won’t be displayed under the same measurement point. Some measurement points only collect static data, some measurement points collect both static and dynamic data, and some measurement points collect both dynamic and transient data. The type of data a measurement point is capable of collecting depends on the type of the mapped device channel.

Data Type	Device Type	Device Property	Channel Type
Only static data	DAQ Cards	DAQ Module	Position [from Prox], Process
	Modbus RTU/TCP Client, OPC Client	DAQ Module For Process	All types
Both static data and dynamic data	DW device	DAQ Module For DW	Acceleration, Velocity, Vibration [from Prox]
Both dynamic data and transient data	DAQ Cards	DAQ Module	Acceleration, Velocity, Vibration [from Prox]

Graphics View

PCM360 system features three different levels of alarm severity. The color of picture bars indicates the real-time alarm status of the related measurement point, machine, and machine train.

- ✓ **Red:** Danger. The danger set point is exceeded.
- ✓ **Yellow:** Alert. The alert set point is exceeded.
- ✓ **Green:** Normal. No alarm set points are exceeded.

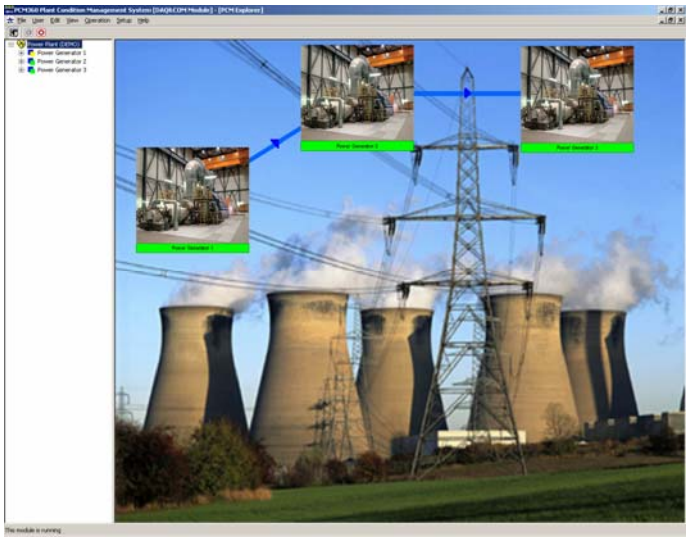
Status of the picture bars:

- ✓ **Flashing:** The related measurement point has ever alarmed and the alarm has not been acknowledged yet.
- ✓ **Solid:** No alarm occurs or the alarm has been acknowledged on the related measurement point, machine and machine train.

If the color of a measurement point picture bar shows flashing green, it indicates that currently the measurement point is in normal status but the measurement point has ever alarmed and you haven't acknowledged the alarm on this measurement point.

PCM360 DAQ&COM Graphics View displays three types of graphics:

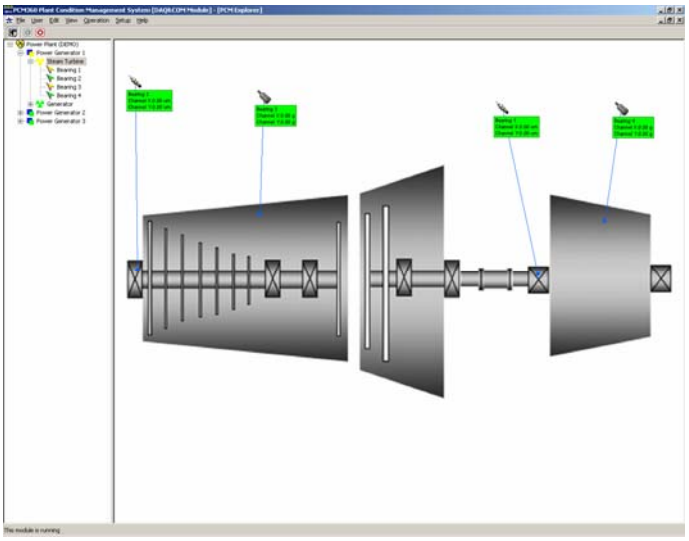
- **Plant-Machine train View:** Directly select a plant from tree view.



- **Machine train-Machine View:** Directly select a machine train from tree view or double click a machine train picture on **Plant-Machine train View**.



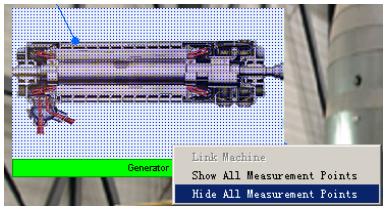
- **Machine-Measurement point View:** Directly select a machine from tree view or double click a machine picture on **Machine train-Machine View**.



Other Functions:

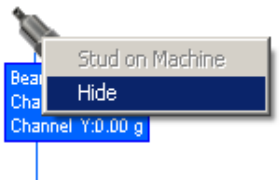
- ***Hide or show all measurement points beneath the machine***

Answer: Ensure **Edit Picture** command from **Edit** menu is unmarked. On **Machine train-Machine View** or **Machine-Measurement point View**, right click the machine picture and select **Hide All Measurement Points** or **Show All Measurement Points** command from shortcut menu.



- ***Hide a single measurement point beneath the machine***

Answer: Ensure **Edit Picture** command from **Edit** menu is unmarked. On **Machine train-Machine View** or **Machine-Measurement point View**, right click this measurement point and select **Hide** command from shortcut menu.



Operation Menu

Start DAQ

Click this command to start DAQ module on local DAQ Server. With the DAQ module started, all devices on local DAQ Server will start to work. This command has the same function with button on toolbar.

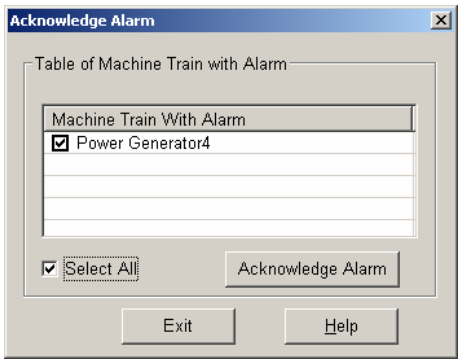
Stop DAQ

Click this command to stop DAQ module on local DAQ Server. Once the DAQ module is stopped, all devices on local DAQ Server will stop working and you can configure the system. This command has the same function with button on toolbar.

Acknowledge Alarm

When alarm occurs, this command is enabled and meanwhile the picture bars of the related machine train, machine and measurement point start to flash. And if alarm severity of the related value returns Normal, to stop flashing status of picture bars, you should acknowledge the alarm.

Click this command and “Acknowledge Alarm” window is launched.



By default, “Select All” will be marked. Directly click **Acknowledge Alarm** button to acknowledge all alarms.

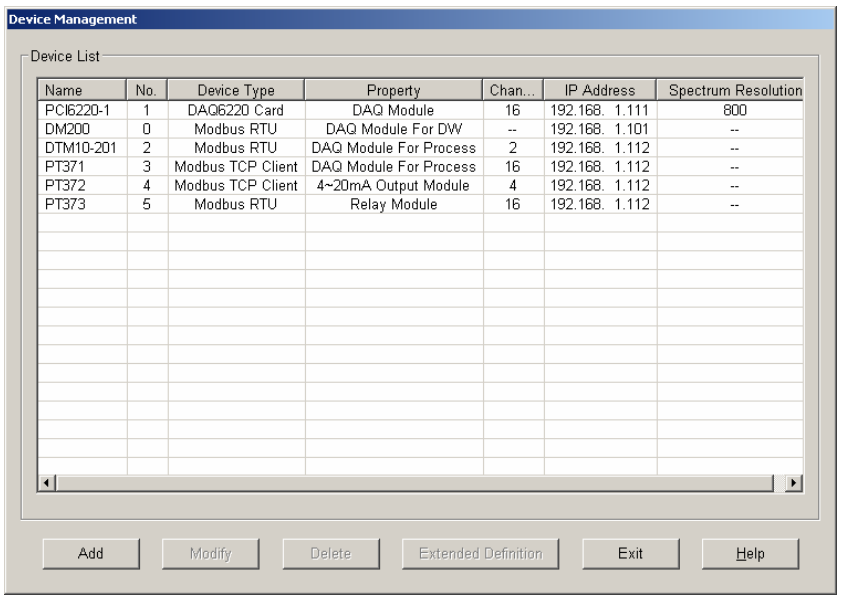
Search Phase Reference

Click this command to search the phase reference (ensure the DAQ module is started). After you clicked this command, system will update the phase reference. The whole process may take you about 20 seconds. **Note** that this command only applies to measurement points that mapped channels of DAQ card, and it works only when the trigger mode of the related phase reference channel is set to “Auto Trigger”.

Setup Menu

Device Management

Click this command to launch “Device Management” window (ensure DAQ module on local DAQ Server is stopped). On this window, you can add new devices, change device properties and delete devices.


Device Management
Device List
Name
No.
Device Type
Property
Chan...
IP Address
Spectrum Resolution
PCI6220-1 1 DAQ6220 Card DAQ Module 16 192.168. 1.111 800
DM200 0 Modbus RTU DAQ Module For DW -- 192.168. 1.101 --
DTM10-201 2 Modbus RTU DAQ Module For Process 2 192.168. 1.112 --
PT371 3 Modbus TCP Client DAQ Module For Process 16 192.168. 1.112 --
PT372 4 Modbus TCP Client 4~20mA Output Module 4 192.168. 1.112 --
PT373 5 Modbus RTU Relay Module 16 192.168. 1.112 --
Add
Modify
Delete
Extended Definition
Exit
Help

- **Device Parameters Introduction**

Name: Display device name.

No.: Display device No.. This number identifies a unique device in PCM360 system. PCM360 will automatically assign a No. for device when it is added and user can change the device No.. PCM360 system supports maximum 240 devices. The No. range is from 0 to 239.

Device Type: Display device type. Totally, four device types are supported by PCM360 system: Modbus RTU, Modbus TCP Client, OPC Client, and DAQ Cards (including DAQ6013, DAQ6220 and DAQ6250).

Property: The properties of different device types are different. User should set correct property for the related device according to actual application. If in doubt, please contact ProvibTech Representative for types of devices.

Channel Number: Set and display channel number of the related device. Maximum value is 32.

IP Address: Display IP address of the DAQ Server that connects the related device.

Spectrum Resolution: Spectrum resolution decides the number of points contained in each sample. Table below shows the relationship between spectrum resolution and the number of points:

Spectrum Resolution	Points' number per sample
400	1000(1k)
800	2000(2k)
1600	4000(4k)
3200	8000(8k)
6400	16000(16k)
12800	32000(32k)

- **Add (Button)**

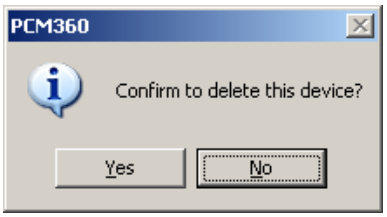
Click this button to add a new device. Note that when add DAQ cards or Modbus RTU based devices, ensure the DAQ Server has connected the actual hardware DAQ devices, and the related device driver is already installed on the DAQ Server.

- **Modify (Button)**

Select a device from the list and click this button to launch "Modify Device Information" window. User could rename the selected device on the window. And if the type of device is DAQ Card, user could also modify the spectrum resolution of the device.

- **Delete (Button)**

Select a device from the list and click this button, then a message box will be launched. Click **Yes** button to delete the selected device.



CAUTION: We do not recommend deleting the devices that were added on other DAQ Servers.

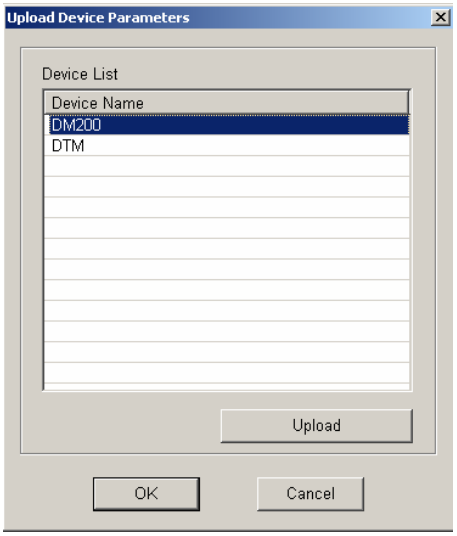
- **Extended Definition (Button)**

The function only applies to devices that are added on local DAQ Server. Select the device and then this button is enabled. For different types of devices, clicking this button will launch different windows (See ***PCM360 Devices/DAQ Cards***, ***PCM360 Devices/PCM360 OPC Client***, ***PCM360 Devices/PCM360 Modbus RTU***, and ***PCM360 Devices/PCM360 Modbus TCP Client*** of this manual to get more details). Especially, for DW

devices, after finished the extended parameter settings, you should upload the device parameters from the hardware device (See ***PCM360 DAQ&COM Software Operation/Setup Menu/Upload Local Device Parameters*** for more details).

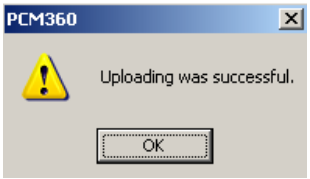
Upload Local Device Parameters

Click this command to launch “Upload Device Parameters” window (ensure DAQ module is stopped). DW devices added on local DAQ Server are listed.

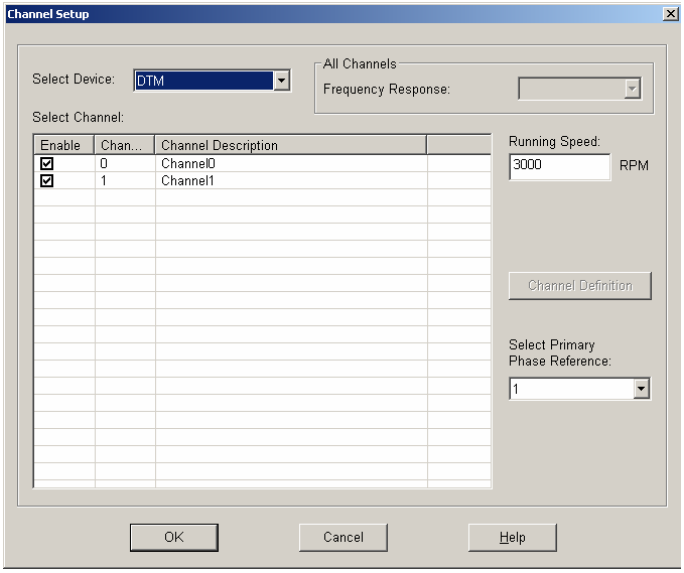


Select a device from the list, and then **Upload** button is enabled. Click this button and software will upload the parameters from the hardware device.

Before uploading the device parameters, **please ensure the hardware device and DAQ module can communicate with each other properly**. For example, select DTM and click **Upload** button. If the uploading succeeded, you will see picture below and you could go to “Channel Setup” window to check the channel parameters of this device.



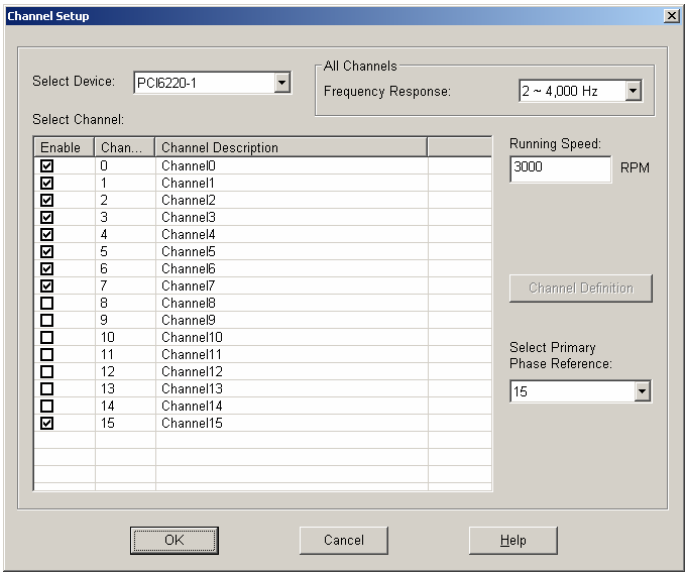
Picture below shows the channels information of DTM on “Channel Setup” window when parameters were uploaded successfully.



CAUTION: If the DW device is re-configured, you must re-upload the parameters; otherwise, the DAQ module can't collect data from the device.

Channel Setup

Click this command to launch "Channel Setup" window (ensure DAQ module is stopped).



- **Select Device**

List all DAQ devices that belong to the current system.

- **Frequency Response**

The parameter only applies to DAQ cards and takes effect only when DAQ card works in asynchronous sampling mode. The frequency response setting decides the sampling frequency of each DAQ card channel. Table below indicates the relationship between frequency response and channel's sampling frequency.

Frequency Response	Channel's Sampling Frequency
0.5-100Hz	0.25KHz(100Hz*2.5)
0.5-1,000 Hz	2.5KHz(1000Hz*2.5)
2-4,000Hz	10KHz(4,000Hz*2.5)
10-20,000Hz	50KHz(20,000Hz*2.5)

And meanwhile, the channel's sampling frequency can't exceed the channel's maximum sampling frequency, which is decided by both the DAQ card's sampling frequency and the enabled channel number. That is,

Channel's Sampling Frequency ≤ Channel's Maximum Sampling Frequency = DAQ Card's Sampling Frequency/ The Enabled Channel Number

Table below shows the sampling frequency of different DAQ cards.

DAQ Card Type	DAQ Card's Sampling Frequency
6013	200KHz
6220	250KHz
6250	1MHz

For example, if we use a 6013 card and the enabled channel number is 8, the channel's maximum sampling frequency is 25 KHz. Under this condition, you can't set the frequency response to "10-20,000Hz", for the related channel's sampling frequency reaches 50 KHz (exceeds 25 KHz). And if you did so, software will automatically change the value to "2-4000Hz".

- **Running Speed**

Type running speed of machine the current DAQ device channels are mapped to.

NOTE: The running speed is in effect only when there is no phase reference channel under the current DAQ device or the DAQ device works in asynchronous sampling mode.

- **Select Channel**

Display all channels of the selected device.

✓ **Enable (Check box):** Check it to let the channel work. Since the enabled channel number has effect on the channel's sampling frequency (The larger the enabled channel number, the lower the channel's

sampling frequency), we recommend that you do not enable the channels that are not being used!

- ✓ **Channel No.:** Display channel No..
- ✓ **Channel Description:** Display what user inputs in "Channel Description" field on **General** tab.

- **Select Primary Phase Reference**

PCM360 system allows user to define maximum 4 phase reference channels for each DAQ card. The combo box lists all phase reference channels under the selected device. Select one as the primary phase reference channel. Note that it only applies to DAQ cards.

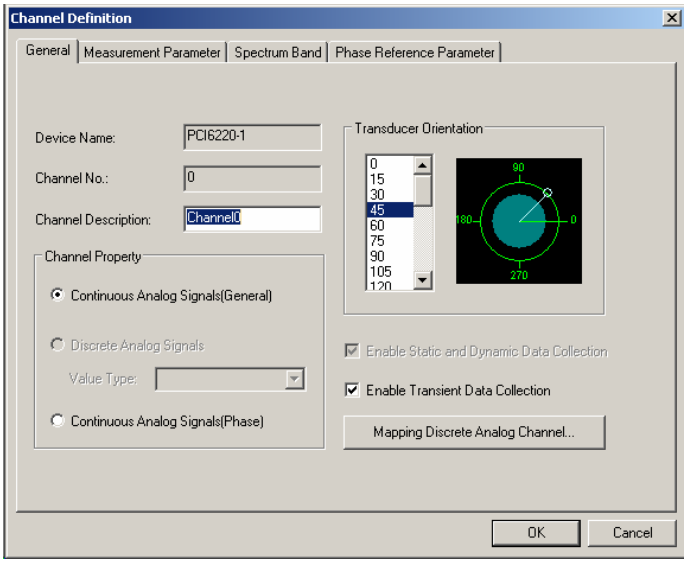
- **Channel Copy and Paste**

Copy channel settings from one channel to another. It will be very convenient while channels are to be configured with almost the same parameters. This saves time and avoids repetitive work. Take channel0 and channel1 as an example and in the case of that channel0 has been configured. Right click **Channel0** and select **Copy** command, and then right click **Channel1** and select **Paste** command.

- **Channel Definition (Button)**

The function is used to define and set all channel parameters. Select an enabled channel and click **Channel Definition** button. "Channel Definition" window is launched. See ***General Tab***, ***Measurement Parameter Tab***, ***Spectrum Band Tab***, ***Phase Reference Parameter Tab***, and ***Channel Setup for DTM10-201/10-301/20-101, and DM200*** of this chapter to get more details.

General Tab

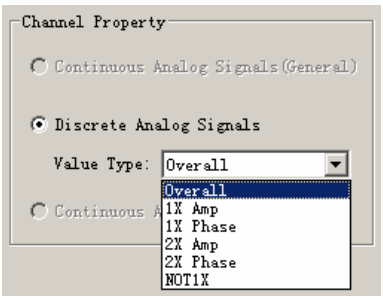


Channel Description (Edit box): Describe the selected channel in short.

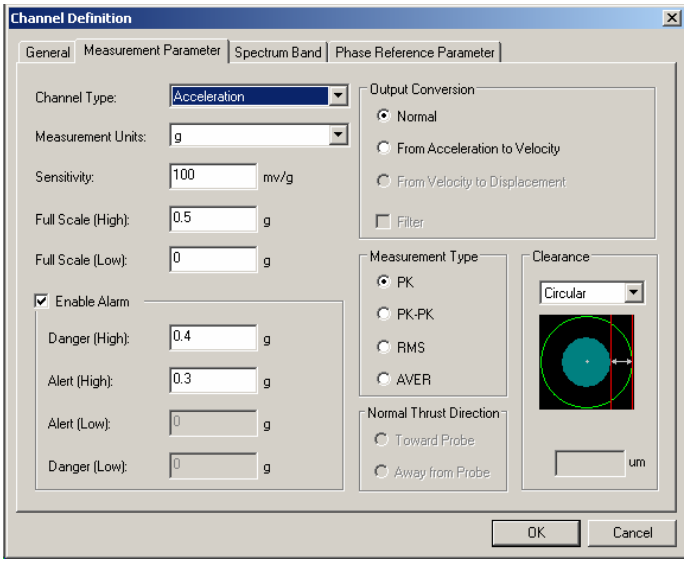
Transducer Orientation (List): By convention, the directions are specified as viewed from the driver end toward the driven end. If you select 90 degrees, the transducer is fixed 90 degrees up of horizontal.

Enable Transient Data Collection (Check box): If the option is selected, the channel will be allowed to collect transient data when the related machine train is triggered by transient trigger condition. **Note** that the option only applies to DAQ card's channel, and the channel should be used to acquire Acceleration, Velocity, or Vibration [from Prox] signal.

Channel Property: Define the type of signal the channel measures according to the actual condition. If the channel is used to measure general analog signal, select "Continuous Analog Signals (General)"; if the channel is used to measure phase reference signal, select "Continuous Analog Signal (Phase)"; if the channel receives process data from device based on Modbus or OPC protocol, select "Discrete Analog Signals" and set the value type (Overall, 1X amplitude, 1X phase angle, 2X amplitude, 2X phase angle, NOT1X amplitude) according to the actual condition.



Measurement Parameter Tab



Channel Type (List): Select the type of channel according to the actual signal coming from the connected transducer.

Measurement Units (List): Select appropriate measurement unit for the variable.

Sensitivity (Edit box): Input actual sensitivity of the transducer.

Full Scale (High) (Edit box): Input maximum value of full scale range. Full scale range defines the entire span of the data to be displayed. A larger range can accommodate a wider set of data values.

Full Scale (Low) (Edit box): Input minimum value of full scale range.

Enable Alarm (Check box): Mark it to enable alarm on current channel. When the channel alarms (the measured value exceeds the related alarm set points), and meanwhile, the machine train the channel belongs to is set to “Alarm Trigger” property, all channels under the machine train that are allowed data collection start to collect data. For Acceleration, Velocity, and Vibration [from Prox] channels, two alarm levels should be set; for Position [from Prox] and Process channels, four alarm levels should be set.

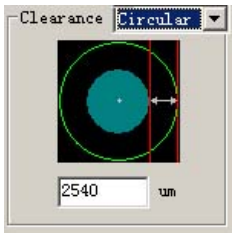
Output Conversion (Check box): Output Conversion determines variable type that will be displayed on Display software. If transducer type is acceleration but you want to get velocity, you should select “From Acceleration to Velocity” mode.

Measurement Type: PK, PK-PK, RMS, and AVER.

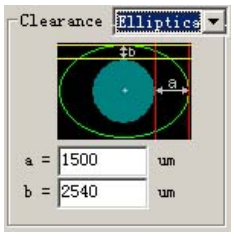
Normal Thrust Direction: Define the normal direction as movement "toward" the transducer or "away from" the transducer. If the normal movement of the machine rotor is toward the transducer then "Toward Probe"

should be selected. Otherwise, select "Away from Probe". The function is in effect only for Vibration [from Prox] and Position [from Prox] channels.

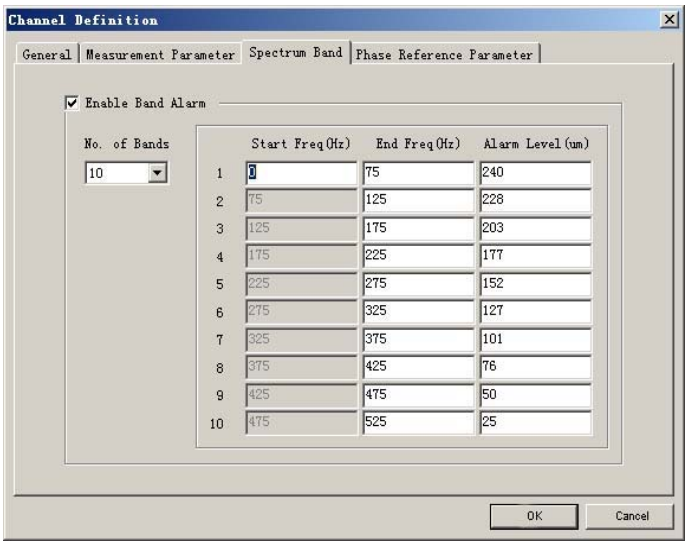
Clearance (Check box): Clearance is distance between the rotor and the bearing shell. This is normally a very small value, measured in few mils or micrometers. Select the shape of bearing shell first: **Circular** or **Elliptical**. For a circular bearing, type clearance value in the edit box:



For an elliptical bearing, type value of **a** and **b** in the related edit boxes: **a** is the X-clearance (traditionally defined as horizontal) and **b** is the Y-clearance (traditionally defined as vertical).

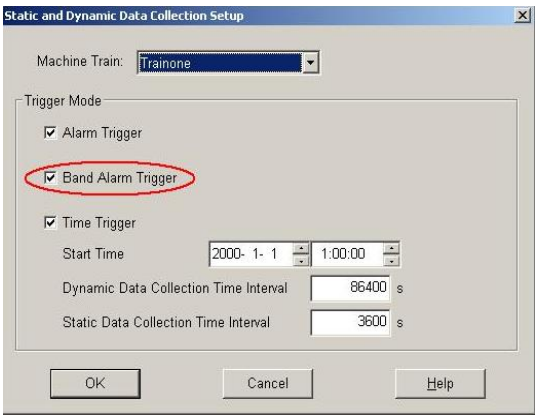


Spectrum Band Tab



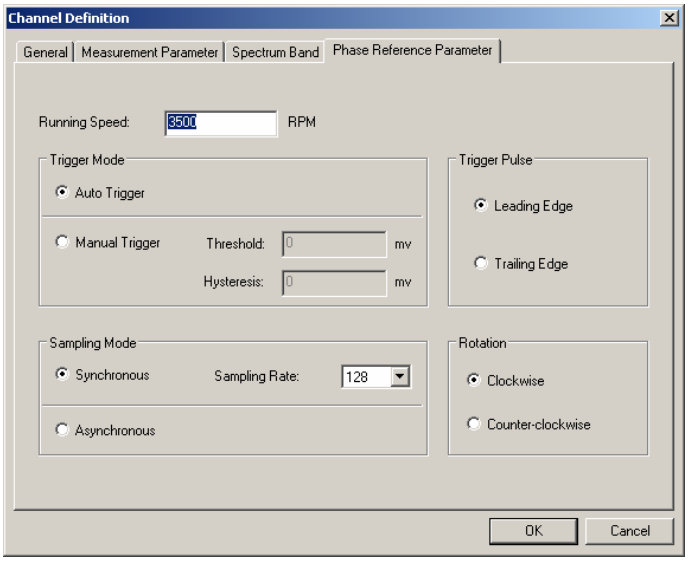
The function is used to enable band alarm on current channel: Mark “Enable Band Alarm” first, then set band number from combo box, and later enter each frequency band range and its corresponding alarm level. For example, if you select 10, you should set the end frequency and band alarm line for ten frequency bands. **You can view band alarm information on alarm list.**

When band alarm occurs on the channel (the measured value exceeds the related alarm level), and meanwhile, the machine train the channel belongs to is set to “Band Alarm Trigger” property (see picture below), all channels under the machine train that are allowed data collection start to collect dynamic data.



NOTE: Only Acceleration, Velocity, and Vibration [from Prox] measured channel of DAQ card can be set band alarm function.

Phase Reference Parameter Tab



Running Speed (Edit box): Type the rated running speed of the machine trains. It is in effect only when the current device works in synchronous sampling mode.

Trigger Mode (Check box):

- ✓ **Auto:** In this mode, when user uses “Search Phase Reference” command, software will automatically detect the phase reference signal. About twenty seconds later, open the related waveform plot, the phase

reference signal will be displayed. To verify the phase reference signal, you can go to “Calibration” window of the phase reference channel to view the original voltage waveform.

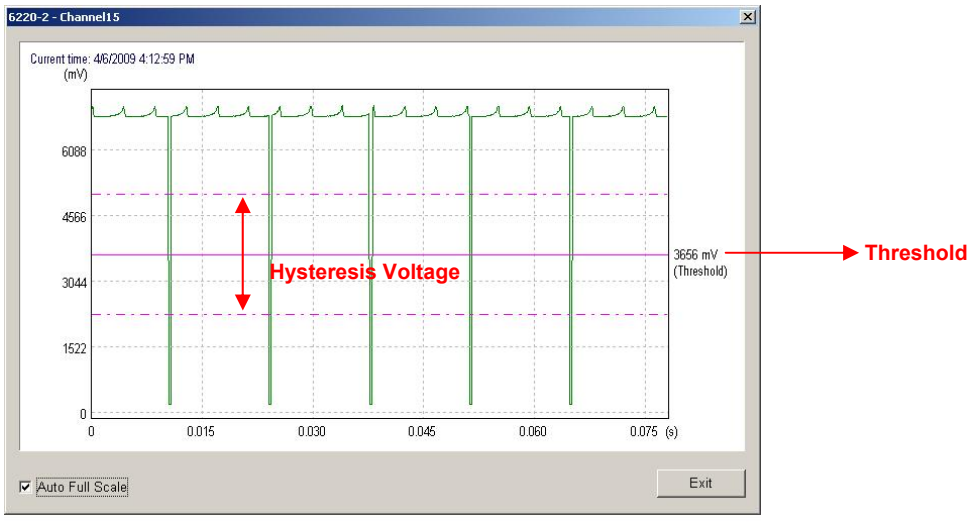
Since the field circumstance is complicated, software may fail to detect the phase reference signal for some unpredictable reason. If there is no phase reference signal present on the waveform or the detected phase reference signal is not as you wish, you are recommended to select “Manual Trigger” mode to detect the phase reference signal.

✓ **Manual:** In this mode, you should set the Threshold and Hysteresis voltage manually. If the phase reference signal is in “leading edge” trigger pulse, it will be triggered when the input signal passes the threshold voltage plus 1/2 of the hysteresis voltage; if it is in “trailing edge” trigger pulse, it will be triggered when the input signal returns to the threshold voltage minus 1/2 of the hysteresis voltage.

Threshold: The voltage level at which the trigger is initiated.

Hysteresis: The minimum voltage shift that is allowed when detecting a phase reference change of state.

User that select “Manual Trigger” mode to detect the phase reference signal could get the proper **Threshold** and **Hysteresis** voltage from the original voltage waveform window of the phase reference channel.



On “Calibration” window, select the phase reference channel and click **Graph** button. The picture above shows the original voltage waveform of the phase reference channel. The pink real line indicates the Threshold. **Threshold voltage** is generally set as 1/2 of PK-PK voltage. The two pink dashed lines are Hysteresis lines. **Hysteresis voltage** is generally set as the difference between the two hysteresis lines.

Trigger Pulse: Select “leading edge” or “trailing edge”.

Rotation (Check box): Select either CCW or CW. By convention, these directions are specified as viewed from driver end toward driven end.

Sampling Mode:

- ✓ **Synchronous, Sampling Rate:** Select Synchronous and sampling rate. Sampling rate is the number of samples to be taken per shaft revolution. You can select to take 32, 64, 128, 256, 512 or 1024. Maximum sampling rate depends on sampling frequency of channel and running speed of machine train. Sampling rate should match the following expression:

Sampling Rate ≤ (60*DAQ Card's Sampling Frequency) / (The Enabled Channel Number * Running Speed of Machine Train)

For example, if the machine train's running speed is set to 3000RPM and we used 6220 card (the sampling frequency is 250KHz), and meanwhile 8 channels are used. Thus, the maximum sampling rate is 625 (60*250 KHz/ (8*3000RPM)). So the maximum sampling rate you can select is 512.

- ✓ **Asynchronous:** If channel works in asynchronous, channel's sampling frequency should match:

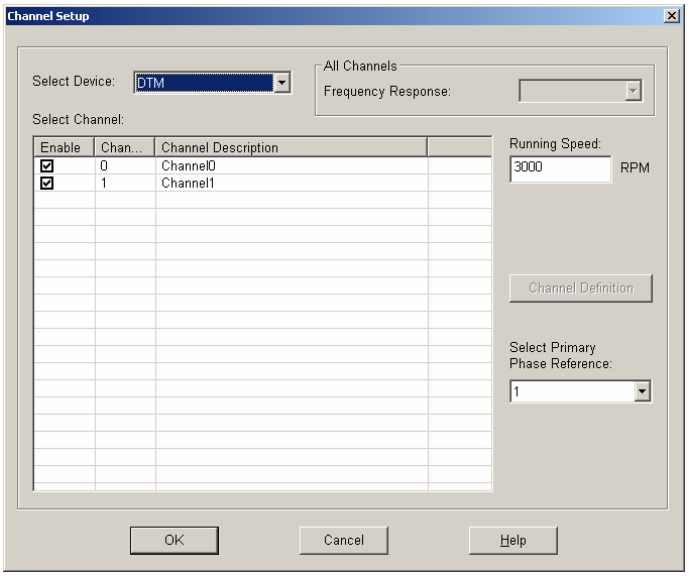
Channel's Sampling frequency ≤ DAQ Card's Sampling Frequency / The Enabled Channel Number

Channel Setup for DTM10-201/10-301/20 and DM200

After parameters of DW devices are uploaded, the device channels will be displayed on "Channel Setup" window. And moreover the most parameters of the device channels are defined and can't be changed.

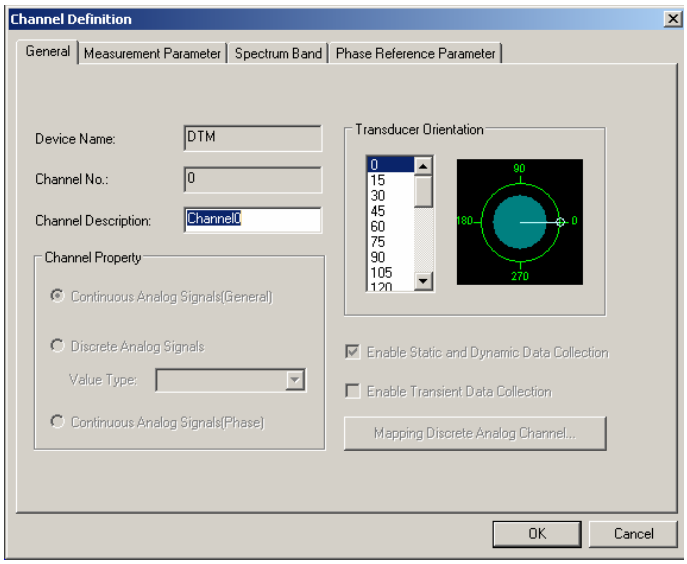
- **DTM**

For DTM (DTM10-201/10-301/20) that supports condition monitoring, by default two channels are defined.

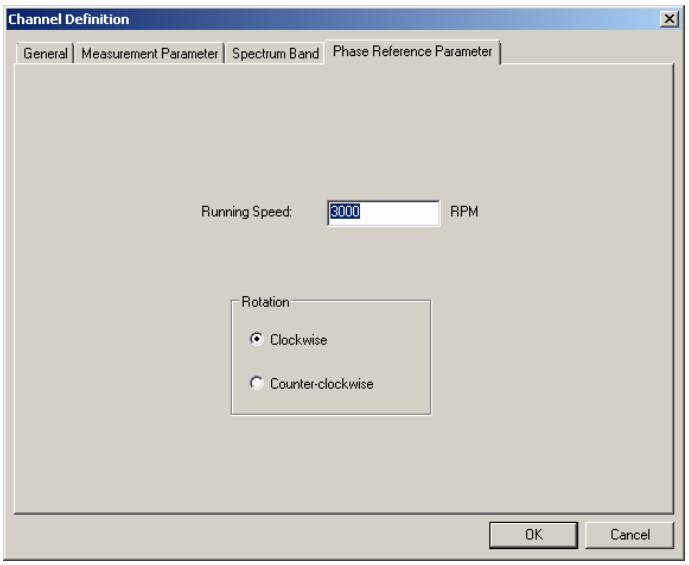


Channel 0 is defined as a general continuous analog channel to collect both dynamic and static data while channel 1 is used as a phase reference channel to get phase reference signal. To change parameters, select the channel and then click **Channel Definition** button.

For channel 0, on **General** tab you can change the channel description and set the transducer orientation according to field requirement.

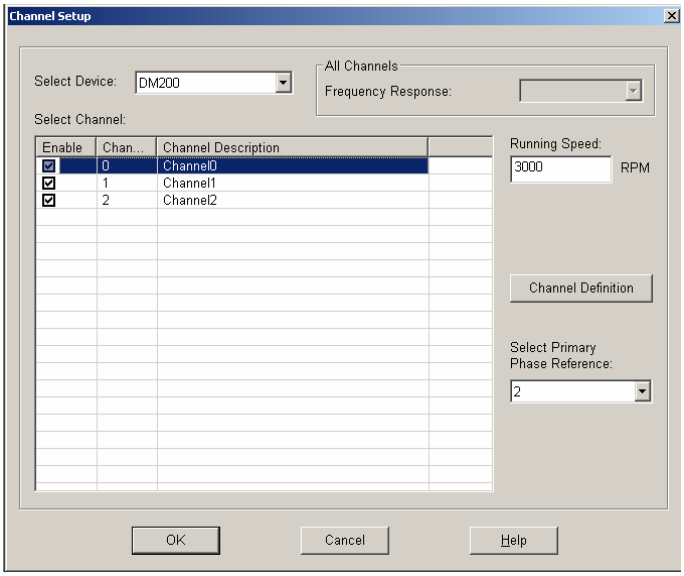


And for channel 1, besides the channel description and transducer orientation, you should also set the running speed and rotation direction of the machine on **Phase Reference Parameter** tab.



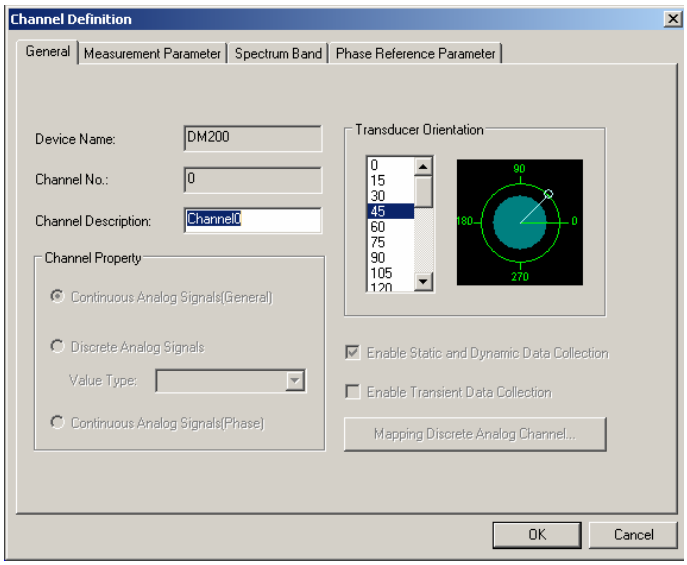
- **DM200**

For DM200 that supports condition monitoring, by default three channels are defined.

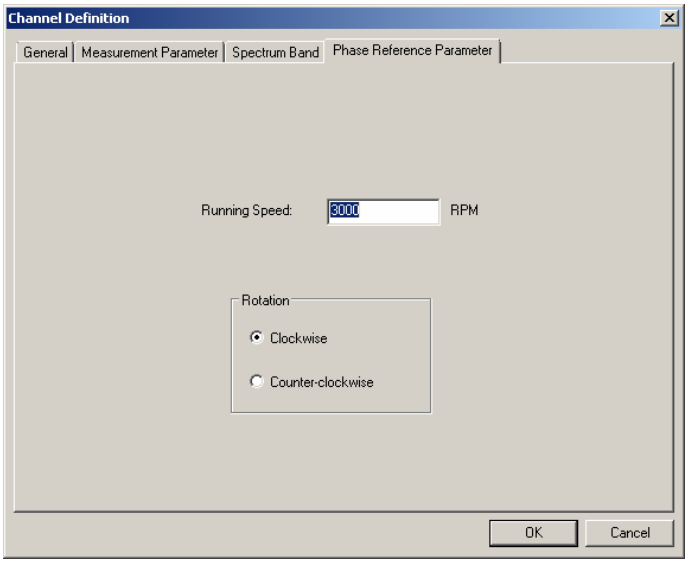


Channel 0 and channel 1 are defined as general continuous analog channels to collect both dynamic and static data, while channel 2 is used as a phase reference channel to get phase reference signal. To change parameters, select the channel and then click **Channel Definition** button.

For channel 0 and channel 1, on **General** tab, you can change the channel description and set the transducer orientation according to field requirement.



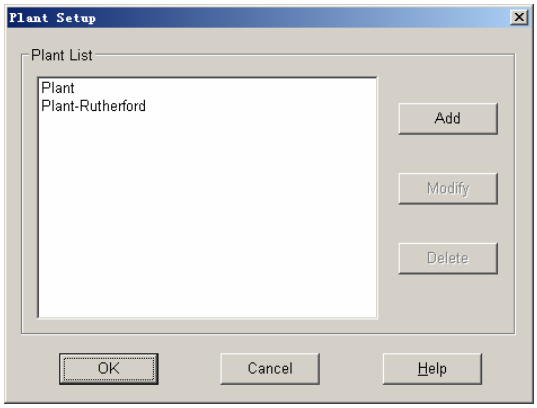
And for channel 2, besides the channel description and transducer orientation, you should also set the running speed and rotation direction of the machine on **Phase Reference Parameter** tab.



Plant Setup

Click this command to open “Plant Setup” window (make sure DAQ module on local DAQ Server is stopped).

On this window, you can add new plants, change plant’s properties and delete plants.



- **Add (Button)**

Click this button to add a new plant. Enter the plant name and then click **Select Picture** button to specify a picture for this plant, and finally click **OK** button to save the information. Note that the acceptable picture type is .bmp.

- **Modify (Button)**

Select the plant from the list and click **Modify** button. You could change the plant name or select another picture for this plant and then click **OK** button to save the changed information.

- **Delete (Button)**

Select the plant from the list and then click **Delete** button, and finally click **Yes** button on confirmation window.

- **OK (Button)**

Click this button and then click **Yes** button on the confirmation window to close the window with plant information to be updated on all DAQ Servers and Display Terminals.

- **Cancel (Button)**

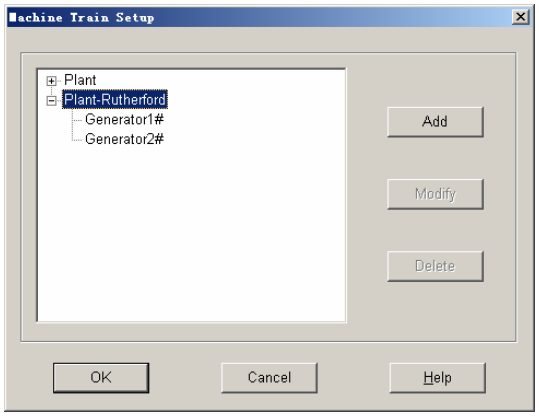
Click this button to close the window without updating all plant information.

- **Help (Button)**

Click this button to view the help contents.

Machine Train Setup

Click this command to open “Machine Train Setup” window (make sure DAQ module on local DAQ Server is stopped). On this window, you can add new machine trains, change machine train’s properties and delete machine trains.



- **Add (Button)**

Select a plant from the list and then click **Add** button. Enter machine train name and click **Select Picture** button to specify a picture for the new machine train, and finally click **OK** button to save the information. Note that the acceptable picture type is .bmp.

- **Modify (Button)**

Select the machine train from the list and click **Modify** button. You could change the machine train name or select another picture for this machine train, and then click **OK** button to save the changed information.

- **Delete (Button)**

Select the machine train from the list and click **Delete** button, and finally click **Yes** button on confirmation window.

- **OK (Button)**

Click this button and click **Yes** button on the confirmation window to close the window with machine train information to be updated on all DAQ Servers and Display Terminals.

- **Cancel (Button)**

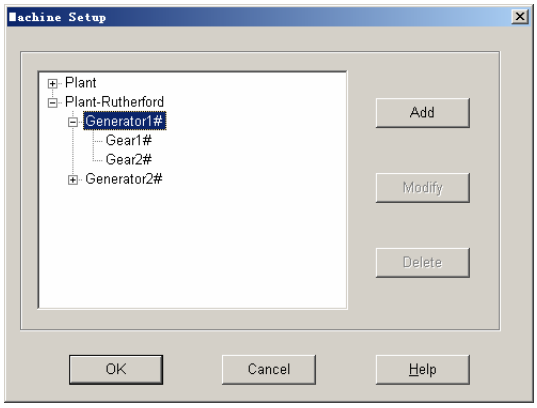
Click this button to close the window without updating all machine train information.

- **Help (Button)**

Click this button to view the help contents.

Machine Setup

Click this command to open “Machine Setup” window (make sure DAQ module on local DAQ Server is stopped). On this window, you can add new machines, change machine’s properties and delete machines.



- **Add (Button)**

Select a machine train from the list and then click **Add** button. Enter machine name and then click **Select Picture** button to select a picture for this machine, and finally click **OK** button to save the information. Note that the acceptable picture type is .bmp.

- **Modify (Button)**

Select the machine from the list and then click **Modify** button. You could enter a new name or click **Select Picture** button to select another picture for this machine, and then click **OK** button to save the changed information.

- **Delete (Button)**

Select the machine from the list and then click **Delete** button, and finally click **Yes** button on the confirmation window.

- **OK (Button)**

Click this button and click **Yes** button on the confirmation window to close the window with machine information to be updated on all DAQ Servers and Display Terminals.

- **Cancel (Button)**

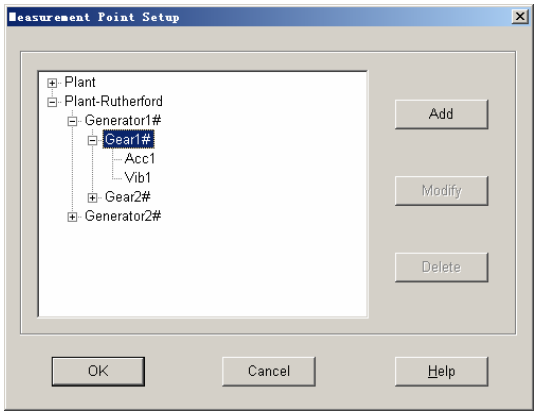
Click this button to close the window without updating all machine information.

- **Help (Button)**

Click this button to view the help contents.

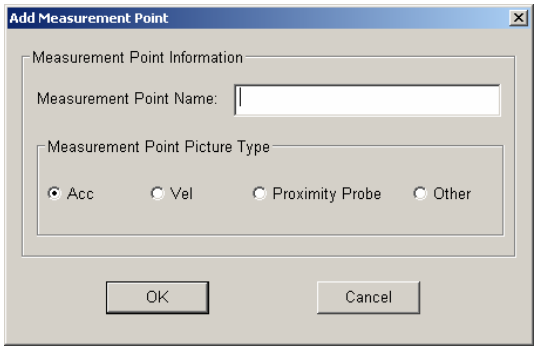
Measurement Point Setup

Click this command to open “Measurement Point Setup” window (make sure DAQ module on local DAQ Server is stopped). On this window, you can add new measurement points, change measurement point’s properties and delete measurement points.



- **Add (Button)**

Select a machine from the list and then click **Add** button.



Enter the name and then select the picture type for the new measurement point. DAQ&COM will automatically specify the picture that relates to this type, finally, click **OK** button to save the information. **PCM360 system is capable of monitoring maximum 3200 measurement points.**

- ✓ **Acc:** For measurement points that connect acceleration transducer.
- ✓ **Vel:** For measurement points that connect velocity transducer.
- ✓ **Proximity Probe:** For measurement points that connect proximity probe.
- ✓ **Other:** For measurement points that connect other types of transducer.

- **Modify (Button)**

Select the measurement point from the list and click **Modify** button. You could change the name or picture of the measurement point.

- **Delete (Button)**

Select the measurement point from the list and click **Delete** button, and finally click **Yes** button on the confirmation window.

- **OK (Button)**

Click this button and click **Yes** button on the confirmation window to close the window with measurement point information to be updated on DAQ Servers and Display Terminals.

- **Cancel (Button)**

Click this button to close the window without updating measurement point information.

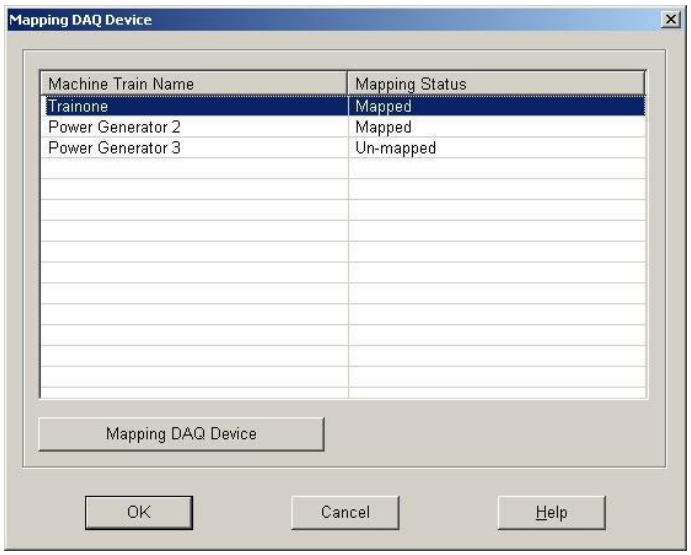
- **Help (Button)**

Click this button to view the help contents.

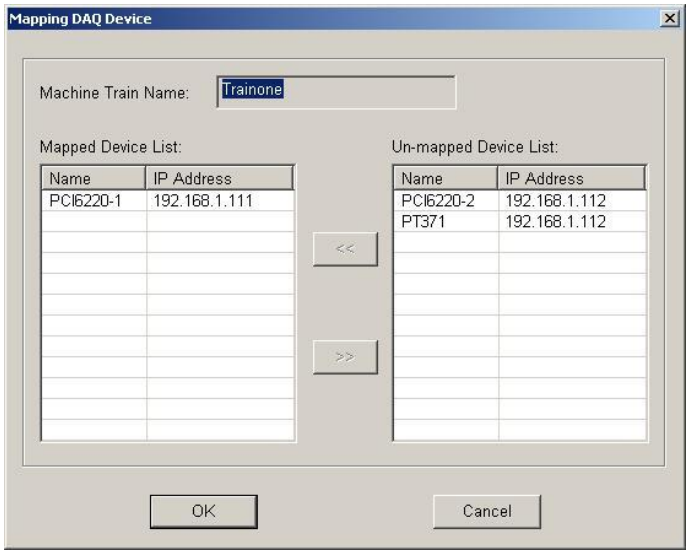
Mapping DAQ Device

Mapping is the process of linking a data source to a measurement point. This process links a monitored location on a machine train with hardware device that is actually collecting the data.

Ensure DAQ module on local DAQ Server is stopped, and then select **Mapping DAQ Device** from **Setup** menu.



- **Mapping Status:** "Mapped" indicates the machine train has mapped DAQ devices while "Un-mapped" indicates the machine train hasn't mapped any DAQ devices.
- **Mapping DAQ Device (Button):** Select a machine train first, and then click this button.



Mapped Device List: List DAQ devices that are mapped by the selected machine train.

Un-mapped Device List: List DAQ devices that haven't been mapped by any machine trains.

<< **:** Left shift button.

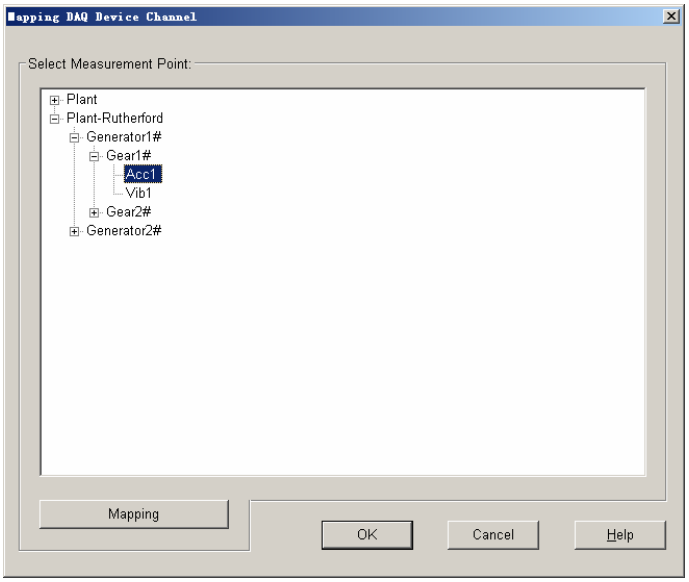
>> **:** Right shift button.

To map a DAQ device with the machine train, you should select the device from "Un-mapped Device List" and then click << button to move it to "Mapped Device List". Note that a machine train only maps DAQ devices

that are added on the same DAQ Server, i.e. DAQ devices that are mapped by a machine train must have the same IP Address.

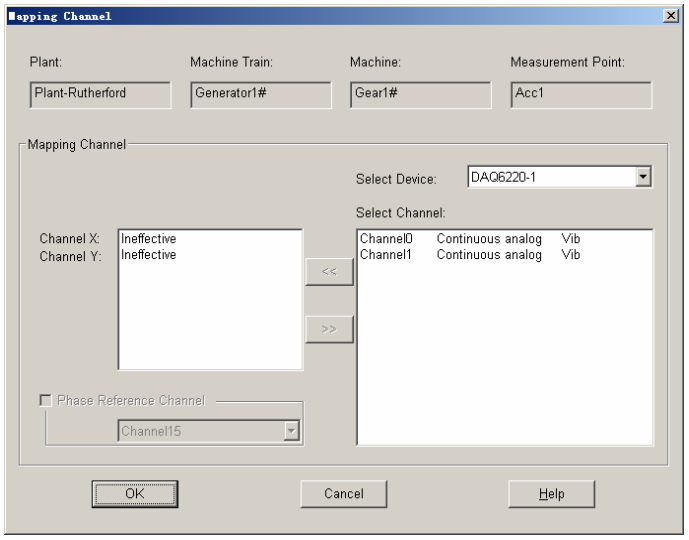
Mapping DAQ Device Channel

Mapping is the process of linking a data source to a measurement point. This process links a monitored location on a machine train with hardware device that is actually collecting the data. Ensure DAQ module on local DAQ Server is stopped, and then select **Mapping DAQ Device Channel** from **Setup** menu.

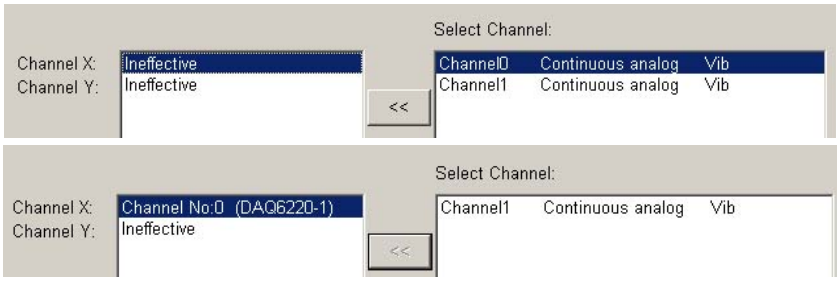


To map DAQ device channel with measurement point channel:

1. On “Mapping DAQ Device Channel” window, select a measurement point and then click **Mapping** button. “Mapping Channel” window is launched.



2. Select a device you want to map (in this example, we select a DAQ device named “DAQ6220-1”), and then the un-mapped channels under the device are displayed. Select a measurement point channel (for example: Channel X) and meanwhile select the device channel, and then click the activated << button.



If the selected measurement point has two channels, repeat the step to map Channel Y.



3. If there are phase reference channels under the device, mark “Phase Reference Channel” and then select a phase reference channel. **If multiple DAQ cards share one physical phase reference signal, please ensure that current DAQ Card hardware correctly connected to the phase reference signal.**

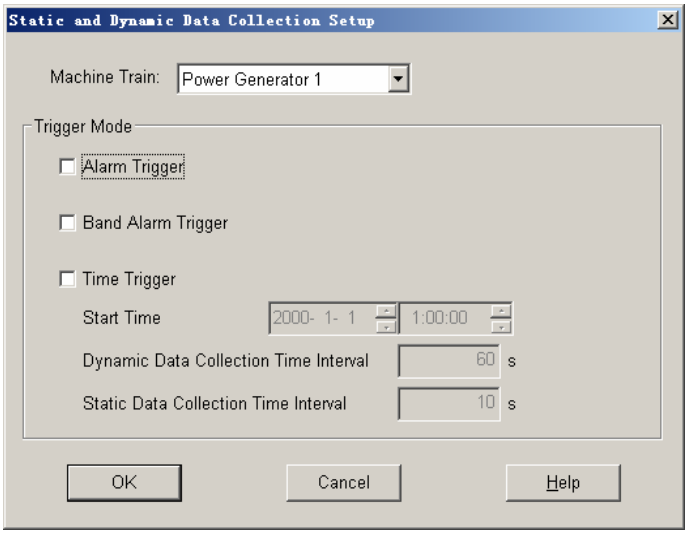


4. After finished the mapping operation, click **OK** button to save the information.

CAUTION: For the dual-channel measurement points, the two measurement point channels should map the DAQ channels that have the same setting on measurement parameters tab, the same channel property, and the same data collection condition.

Static and Dynamic Data Collection Setup

Click this command to open “Static and Dynamic Data Collection Setup” window (make sure DAQ module on local DAQ Server is stopped). On this window, you can set trigger conditions for the machine train to collect static and dynamic data.



Select the machine train and then check the trigger modes, finally click **OK** button.

Alarm Trigger

"Alarm Trigger" means when alarm occurs on a channel that belongs to the machine train, channels under this machine train will start to collect dynamic or/and static data (one sample per triggering). ***The data collection will be started only when the alarm severity of the measured value of the related measurement point channel changed.*** The change could be an alarm severity conversion from ***Normal to Alarm (Alert or Danger)***, or ***Alarm (Alert or Danger) to Normal***, or ***Alert to Danger***, or ***Danger to Alert***.

Table below indicates the relations between DAQ device type, DAQ device property, DAQ channel type and the type of data to be collected when alarm trigger for dynamic and static data collection happens.

Device Type	Device Property	Channel Type	The Collected Data Type
DAQ Cards	DAQ Module	Acceleration, Velocity, Vibration [from Prox]	Dynamic Data
		Position [from Prox], Process	Static Data
Modbus RTU	DAQ Module For DW	Acceleration, Velocity, Vibration [from Prox]	Both Dynamic and Static Data
	DAQ Module For Process	All types	Static Data
Modbus TCP Client	DAQ Module For DW	Acceleration, Velocity, Vibration [from Prox]	Both Dynamic and Static Data
	DAQ Module For Process	All types	Static Data

OPC Client	DAQ Module For Process	All types	Static Data

Band Alarm Trigger

"Band Alarm Trigger" means when band alarm occurs on a channel that belongs to the machine train, all available channels under this machine train will start to collect dynamic data (one sample per triggering).

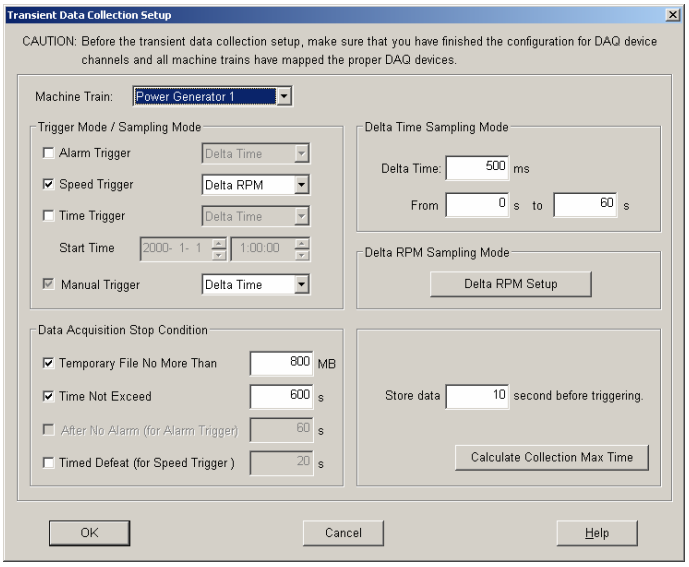
Time Trigger

In this trigger mode, you should set the start time and time interval for both static and dynamic data collection. Time trigger may cause the DAQ channel under the triggered machine train to collect different types of data. See table below:

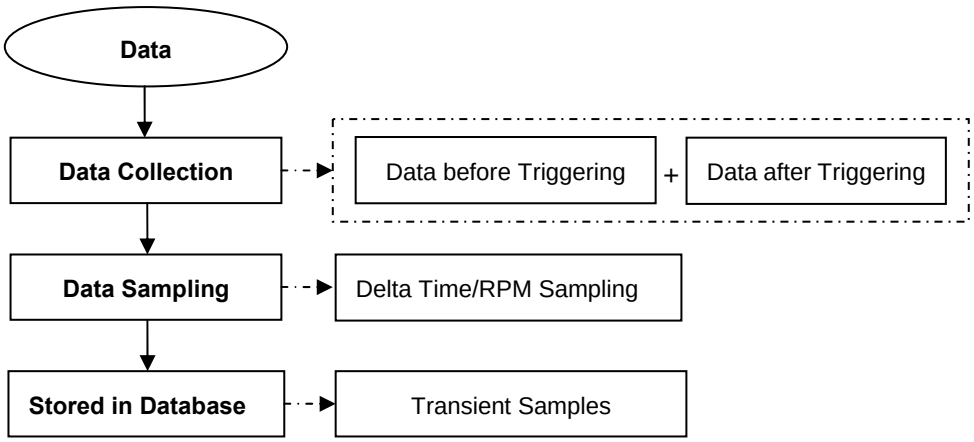
Time Interval	Device Type	Device Property	Channel Type	Data Type
For static data collection	DAQ Cards	DAQ Module	Position[from Prox], Process	Static Data
	Modbus RTU/TCP Client	DAQ Module For DW	Acceleration, Velocity, Vibration[from Prox]	
		DAQ Module For Process	All types	
	OPC Client	DAQ Module For Process	All types	
For dynamic data collection	DAQ Cards	DAQ Module	Acceleration, Velocity, Vibration[from Prox]	Dynamic data
	DW device	DAQ Module For DW	Acceleration, Velocity, Vibration[from Prox]	Both Static data and Dynamic data

Transient Data Collection Setup

Click this command to open "Transient Data Collection Setup" window (ensure DAQ module on local DAQ Server is stopped). The window is used to configure transient collection settings on the machine trains.



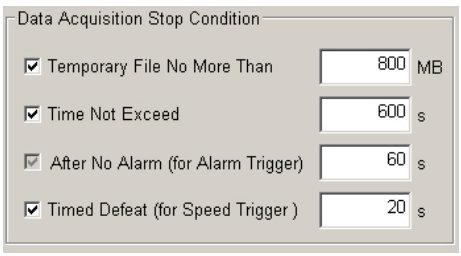
In transient data collection, all transient data will be stored in the transient temporary file first, and then the transient data will be sampled by the specified sampling conditions. After the sampling, all transient samples will be stored in SQL Server database. The transient data collection flow is below:



The collected data consists of two parts: data before triggering and data after triggering. The size of the data before triggering depends on the setting in following edit box.

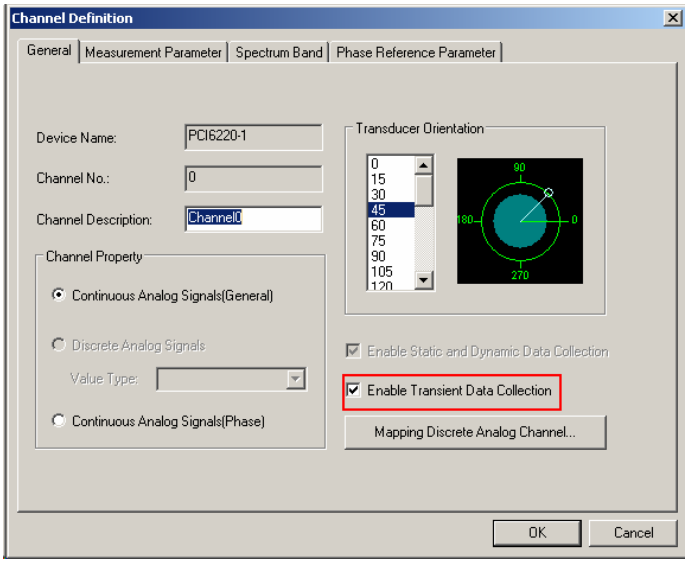


And the size of data after triggering depends on data acquisition stop condition you set.



The Precondition for DAQ Channel to Collect Transient Data

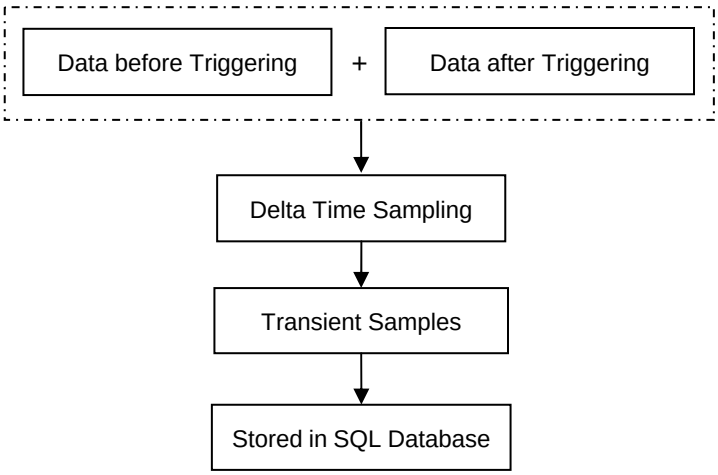
Only DAQ card's Acceleration, Velocity, and Vibration [from Prox] measured channels are capable of collecting transient data. Meanwhile, the DAQ channel under the transient-triggered machine train must be set "Enable Transient Data Collection" property on the channel's "Channel Definition" window.



Alarm Trigger

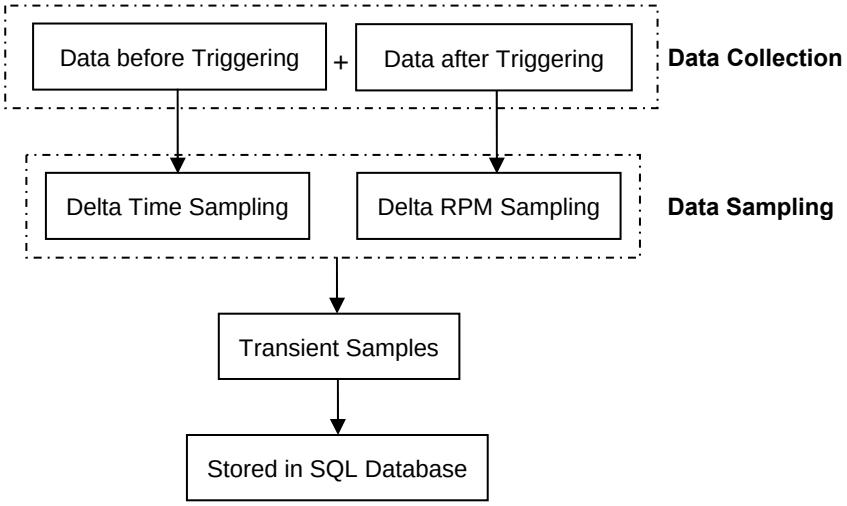
For machine train that is set to "Alarm Trigger", once alarm occurs on a channel that belongs to the machine train, channels under this machine train will start to collect transient data. ***The data collection will be started only when the alarm severity of the measured value of the related measurement point channel changes from normal to alert or danger.***

Picture below presents the data flow in alarm trigger mode. Seen from the data flow, the data no matter collected before triggering or after triggering will be sampled by Delta Time sampling mode (See ***Delta Time Sampling Mode***).

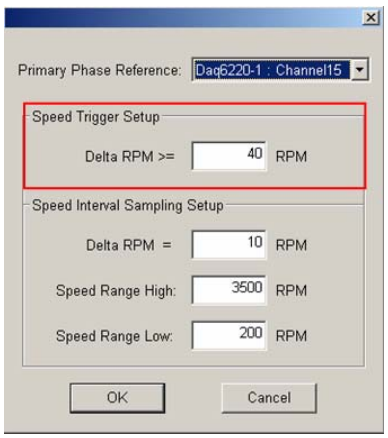


Speed Trigger

Picture below presents the data flow in speed trigger mode.



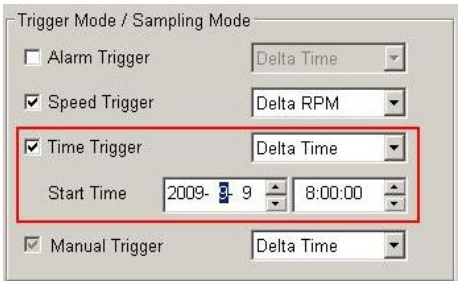
Once the actual Delta RPM of machine train exceeds the specified value, speed trigger occurs. For example, on window below, when Delta speed exceeds 40 RPM, the speed trigger occurs.



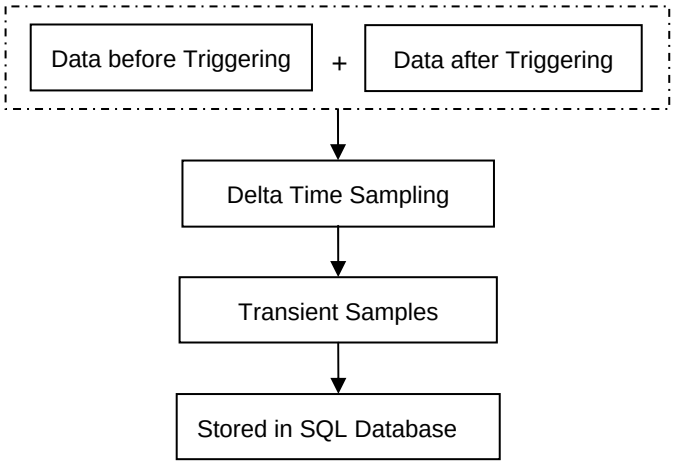
Also it will cause all the precondition matched DAQ channels under the triggered machine train to collect transient data. Seen from the data flow with speed trigger, the speed-triggered data consists of two parts: the data before triggering and the data after triggering. The data before triggering is sampled by Delta Time sampling mode (See ***Delta Time Sampling Mode***) while the data after triggering is sampled by Delta RPM sampling mode (See ***Delta RPM Sampling Mode***).

Time Trigger

In this trigger mode, you should set the start time of the time trigger.



The first time trigger will occur at Start Time. Picture below presents the data flow in time trigger mode.

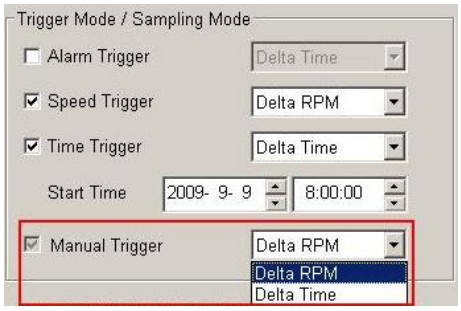


Seen from the data flow, the data no matter collected before triggering or after triggering will be sampled by Delta Time sampling mode (See ***Delta Time Sampling Mode***).

Manual Trigger

This option is marked by default. User should select the data sampling mode manually. If select Delta RPM, the data before triggering will be sampled by Delta time sampling mode and the data after triggering will be sampled by Delta RPM sampling mode; if select Delta Time, the data no matter collected before or after

triggering will be sampled by Delta Time sampling mode.



Delta Time Sampling Mode

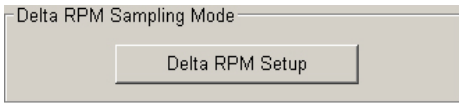


Following is an example to sample data by Delta Time sampling mode. The setting is shown on the picture above. A time trigger occurs at 4/8/2008, 13:23:00.

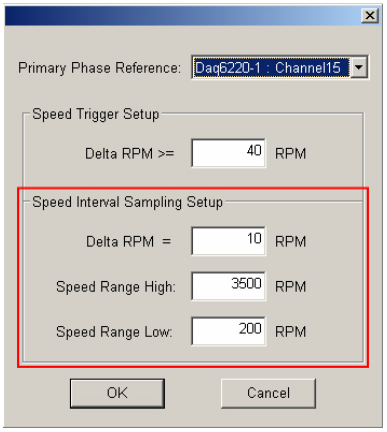
- ✓ **Data before triggering:** 10 samples are stored. The first sample is collected at 13:22:51. The second sample is collected at 13:22:52….the tenth sample is collected at 13:23:00.
- ✓ **Data after triggering:** We suppose DAQ module will collect at least 10 minutes, so data after triggering between 4/8/2008 13:23:01 to 4/8/2008 13:33:00 is sampled. Since data is sampled every 1s, 10 minutes (600 seconds) will store 600 samples.

During this time trigger, totally 610 samples are stored in the database.

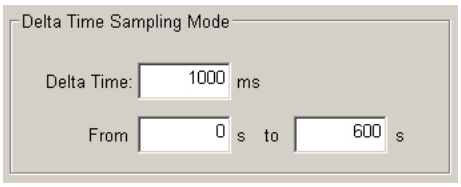
Delta RPM Sampling Mode



Click **Delta RPM Setup** button to set speed sampling parameters.



If data is collected by speed trigger, data before triggering is sampled by Delta Time sampling mode and data after triggering is sampled by Delta RPM sampling mode. Following is an example to sample data when a speed trigger occurs. In a startup, speed increases from 160 to 4000 and speed trigger occurs at 4/9/2008, 13:00:00. When speed reaches 200 (Delta RPM exceeds 40 RPM), speed trigger occurs.



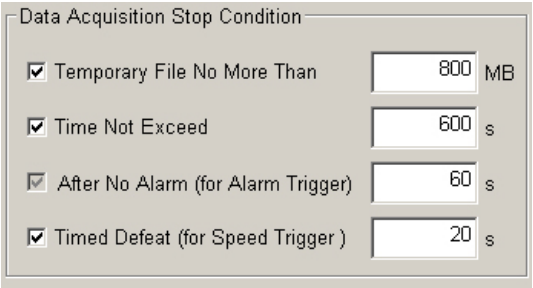


- ✓ **Data before triggering** is sampled every 1s. Ten samples are stored. The first sample is collected at 12:59:51, and the second sample is collected at 12:59:52, and the third sample is collected at 12:59:53…and the tenth sample is collected at 13:00:00.
- ✓ **Data after triggering** is sampled every 10 RPM, started with 200 RPM. 330 samples are stored: (3500-200)/10=330. Data of which speed exceeds 3500 (from 3500 to 4000) will not be stored.

During the speed trigger, totally 340 (330+10) transient samples are stored in database.

Data Acquisition Stop Conditions

All stop conditions take effect at the same time. Once a marked stop condition can't be matched, the data collection will stop.



✓ **Temporary File No More Than**

Supposing that this option is marked and meanwhile the file size is set to 800MB. When the size of temporary file exceeds 800 MB, collection will stop.

✓ **Time Not Exceed**

Supposing that this option is marked and meanwhile the collection time is set to 600s. When the collection time exceeds 600s, collection will stop.

✓ **After No Alarm (for "Alarm Trigger")**

This condition only applies to alarm trigger. Supposing the time is set to 60s. When normal state after the alarm trigger lasts 60s, collection will stop.

✓ **Timed Defeat (for "Speed Trigger")**

This condition only applies to speed trigger. Supposing the time is set to 20s and the Delta RPM to cause the trigger is 40 RPM. When the state in which Delta RPM is less than 40 RPM after the speed trigger lasts 20s, collection will stop.

Collected Data before Triggering

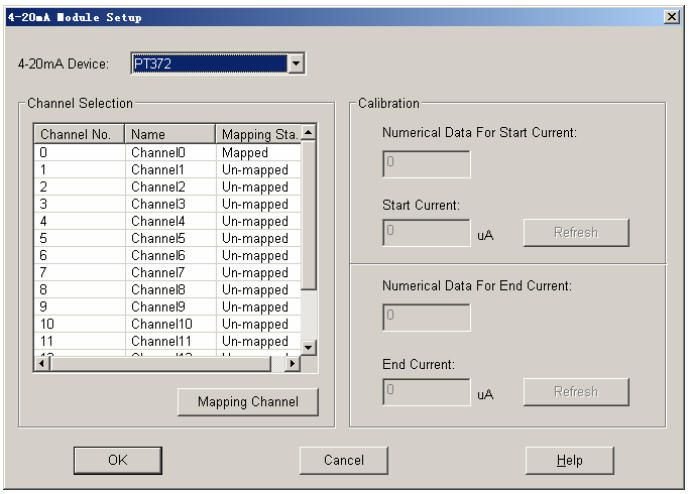
The setting decides the collected data before triggering. If you set the time to 10s, DAQ&COM software will automatically collect the data for 10s before triggering.



4-20mA Module Setup

The current output module transforms digital signal into the 4-20mA current signal, and then outputs the signal to other information systems such as PLC, DCS, etc. Ensure DAQ module is stopped, and then click this

command to launch “4-20mA Module Setup” window. The function is used to configure 4-20mA output modules.

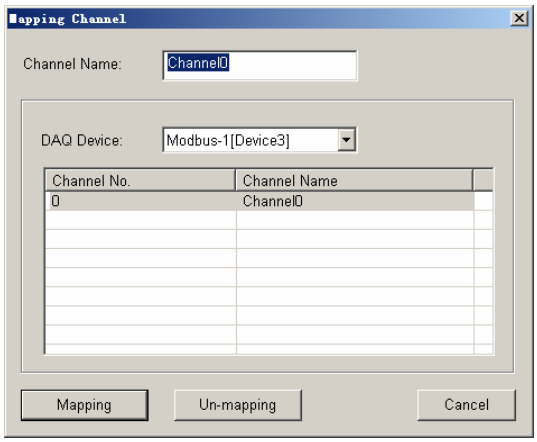


4-20mA Device: List all 4-20mA output devices in PCM360 system.

Channel Selection: List all channels of the selected device.

Mapping Status Indication: “Mapped” indicates the channel has already mapped a DAQ channel; “Un-mapped” indicates the channel hasn’t mapped any DAQ channel; “Suspect” indicates the channel has mapped a DAQ channel but currently the mapped DAQ channel doesn’t exist.

Mapping Channel (Button): Select a channel first and then click this button to open “Mapping Channel” window. On this window, you may either map the selected channel with a DAQ channel, or un-map the selected channel with the DAQ channel.



Channel Name: Display name of the selected 4-20mA channel. User can change the channel name.

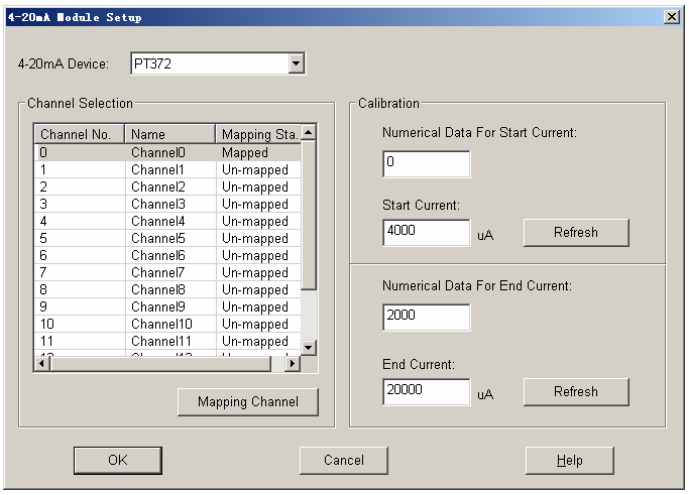
DAQ Device: List all DAQ devices. Select a DAQ device and all channels of this device are displayed. For DAQ cards, phase reference channels won’t be displayed.

Mapping (Button): Select a DAQ channel and then click **Mapping** button to map the 4-20mA channel and DAQ channel.

Un-mapping (Button): Click this button to withdraw the mapping relation between the 4-20mA channel and DAQ channel.

Calibration Example

For a PT372, numerical data range is 0-2000, and current output range is 4mA-20mA. In calibration, numerical data range low is related to current output range low and numerical data range high is related to current output range high.

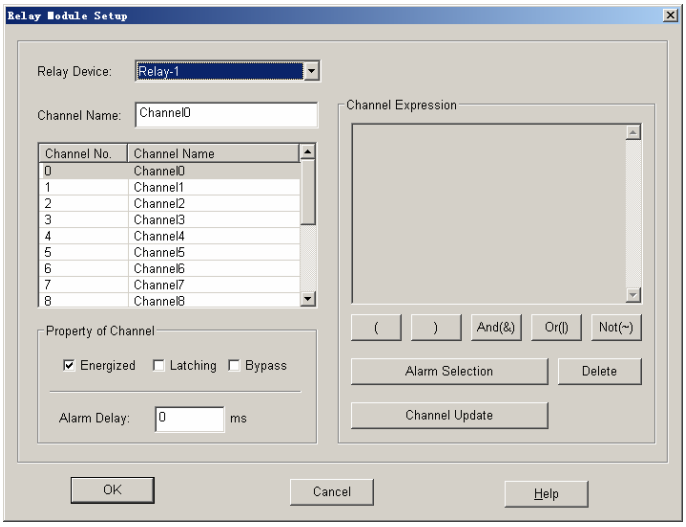


The procedure is below:

1. Select a mapped channel from “Channel Selection” list;
2. Enter “0” in “Numerical Data For Start Current” and enter “4000” in “Start Current”. Click **Refresh** button;
3. Enter “2000” in “Numerical Data For End Current“ and enter “20000” in “End Current”. Click **Refresh** button;
4. Repeat steps above to calibrate all channels.

Relay Module Setup

Click this command to launch “Relay Module Setup” window (ensure DAQ module is stopped). The function is used to configure relay devices.



Relay Device (List): Display all relay devices in PCM360 system.

Channel Name (Edit box): Display name of the selected relay channel. Select a relay device and channels of this device are displayed.

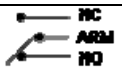
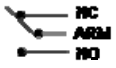
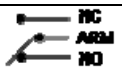
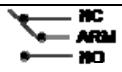
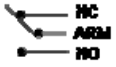
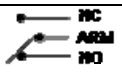
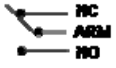
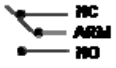
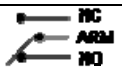
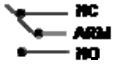
Property of Relay Channel: Set property for each channel according to the actual configuration of the relay. Note that Latching and Bypass cannot be enabled at the same time.

- ✓ **Energized (Check box):** When the relay hardware that maps this channel is set as a Normally Energized relay (NE), you should mark this option. Table below shows the difference between Normally Energized relay and Normally De-energized relay (NDE).

Alarm State	Normally Energized (NE)	Normally De-energized (NDE)
No power No alarm (self state)	NC ARM NO	NC ARM NO
With power No alarm	NC ARM NO	NC ARM NO
With power In alarm	NC ARM NO	NC ARM NO

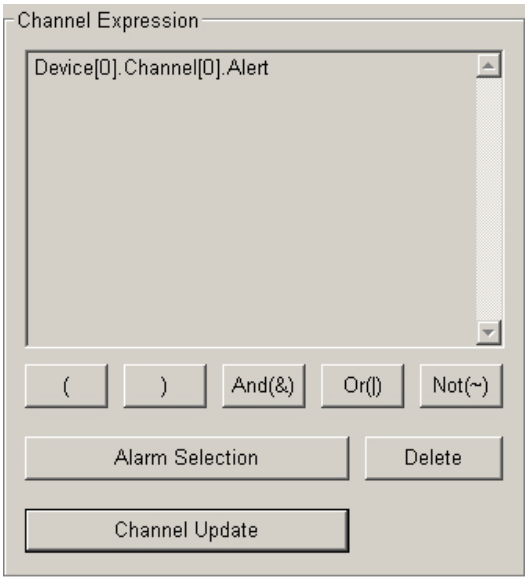
- ✓ **Latching (Check box):** Latch the alarm status of this channel. Alarm latching lets the channel retain the alarm status even though the alarm condition has gone away. And this status will be reset until user resets the relay. The feature helps you know whether the channel has ever alarmed. In DAQ&COM software, when the channel expression returns “TURE”, the relay channel alarms.
- ✓ **Bypass (Check box):** Set the channel to alarm bypass. The feature inhibits both Danger and Alert alarm. In this case, the channel will never alarm and its expression always returns “False”.

Table below shows the relay status when the channel is set to different properties.

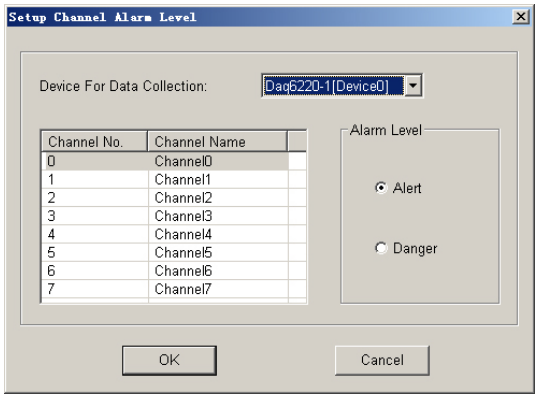
Relay Channel Alarm	Channel Property			Relay Status
	Energized	Latching	Bypass	
Last status: Alarm (No Reset) Current status: No Alarm	√			
	√	√		
	√		√	
Current status: In Alarm	√			
	√	√		
	√		√	
Last status: Alarm (No Reset) Current status: No Alarm				
		√		
			√	
Current status: In Alarm				
		√		
			√	

✓ **Alarm Delay:** Set alarm delay time for each effective channel.

Channel Expression Setup: Define alarm expression for each relay channel.



- ✓ **(,), And (&), Or (|), Not (~):** Operators.
- ✓ **Alarm Selection (Button):** Select alarm level for relay channel.



- ✓ **Delete (Button):** Click this button to delete an operator or channel's alarm level (rest your mouse pointer behind an operator or an alarm level).
- ✓ **Channel Update (Button):** After finished expression setting, user can click this button to check the expression. If the expression is legal, DAQ&COM software will save this expression; if it is illegal, a message box will be launched to inform you.

Calibration

The function is used to calibrate DAQ channels. Click this command (ensure DAQ module on local DAQ Server is started), and a "Warning" window will be launched. The calibration will affect calculating measured value of the PCM360 system, and you should type "YES" in the warning window to continue the operation.

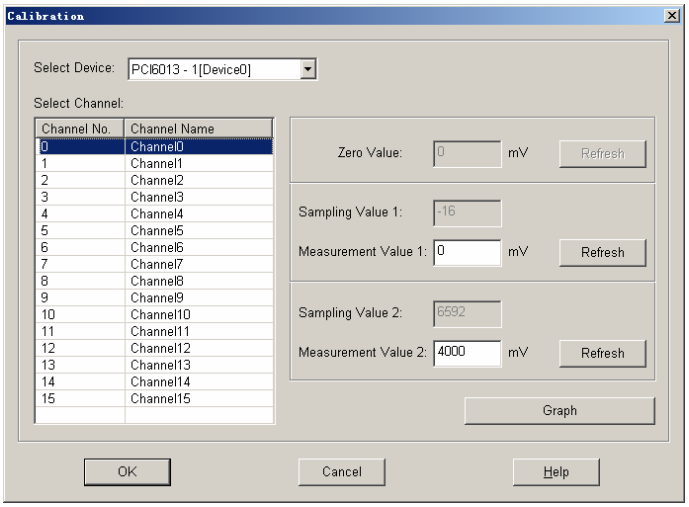
CAUTION:

1. Only administrator has right to execute calibration operation.
2. To apply the calibration, you must stop DAQ module and re-start it.

Calibrate DAQ Card Channels

- ✓ All DAQ card channels being used need to be calibrated, including the phase reference channels.
- ✓ In the calibration, average value (i.e. DC voltage) is used.

- ● **Calibrate Acceleration and Velocity measured channels**



The calibration process is below:

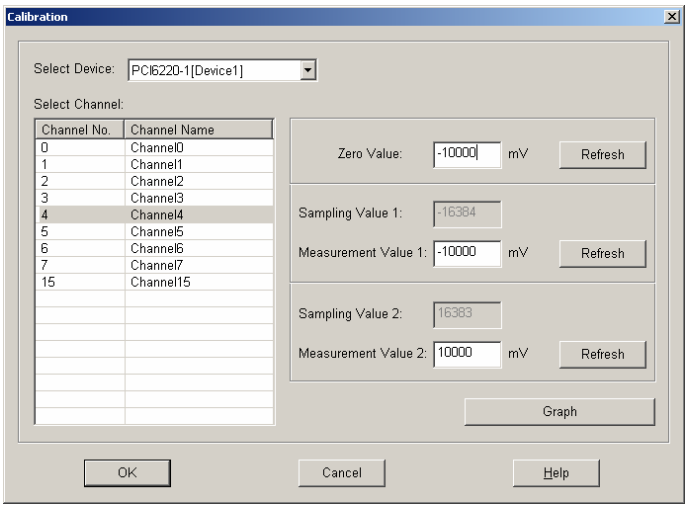
1. Select the channel to be calibrated;
2. Supply a DC voltage to the DAQ channel, and then enter the value in “Measurement Value 1”, later click **Refresh** button;
3. Supply another DC voltage to the DAQ channel, and then enter the value in “Measurement Value 2”, later click **Refresh** button.

After calibrated the channel, user could view original signal waveform of this DAQ channel by clicking **Graph** button. Mark “Auto Full Scale” to automatically full scale the original waveform.

- **Calibrate Vibration[from Prox], Position[from Prox], and Process measured channels**

When calibrate Vibration [from Prox], Position [from Prox], and Process measured channels, user should type the zero value and then click **Refresh** button.

Zero Value: The voltage is measured when machine rotor is not running. If channel’s value is measured by Proximity Probe, we recommend that user locates transducer on a proper position to adjust this value to about -10V (the linearity range of Proximity Probe is from -18V to -2V).



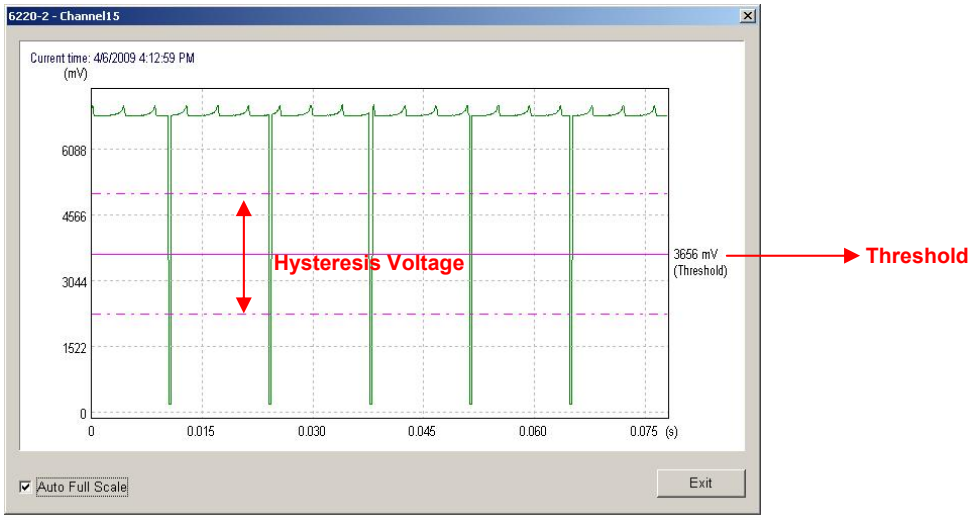
The calibration process is below:

1. Select the channel to be calibrated;
2. Input the zero value and then click **Refresh** button;
3. Supply a DC voltage to the DAQ channel, and then enter the value in “Measurement Value 1”, later click **Refresh** button;
4. Supply another DC voltage to the DAQ channel, and then enter the value in “Measurement Value 2”, later click **Refresh** button.

Especially for Vibration [from Prox] measured channel, after the calibration, user could view original signal waveform of this DAQ channel by clicking **Graph** button.

- **Calibrate the phase reference channel**

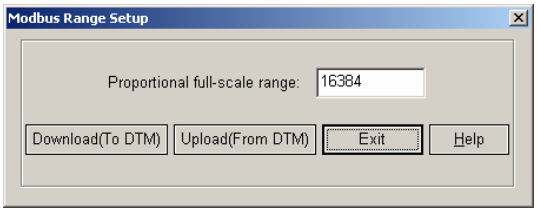
The process of calibrating phase reference channel is the same as that of calibrating Acceleration or Velocity measured channels. And after calibrated the channel, user could check the phase reference signal by viewing its original voltage waveform (click **Graph** button).

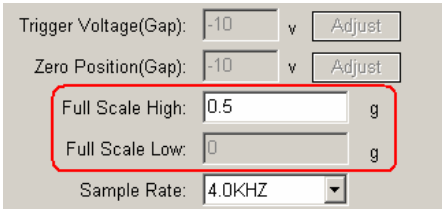


The picture above shows the original signal of the phase reference channel. The pink real line indicates the Threshold. **Threshold voltage** is generally set as 1/2 of PK-PK voltage. The two pink dashed lines are Hysteresis lines. **Hysteresis voltage** is generally set as the difference between the two hysteresis lines.

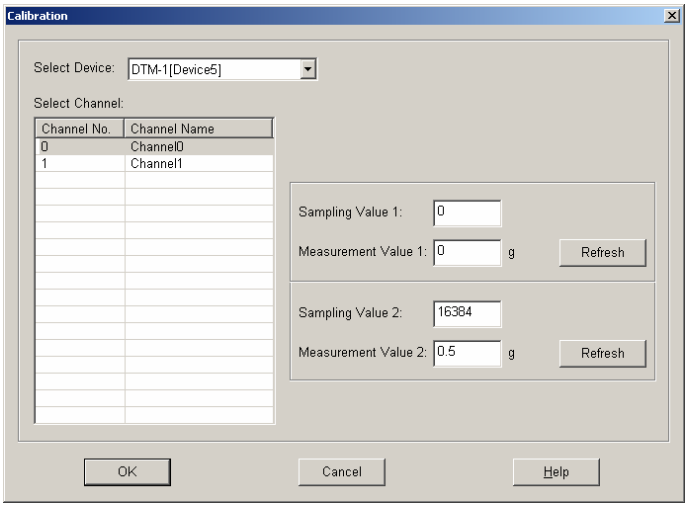
Calibrate Modbus DAQ Channels

When you calibrate Modbus RTU or Modbus TCP Client device that has property of "DAQ Module For Process" (there is no need to calibrate channel of DW device), Modbus proportional range and full scale range are used. Modbus proportional range represents the sampling value while full scale range represents the measurement value. They are all set by the device's configuration software. See pictures below:





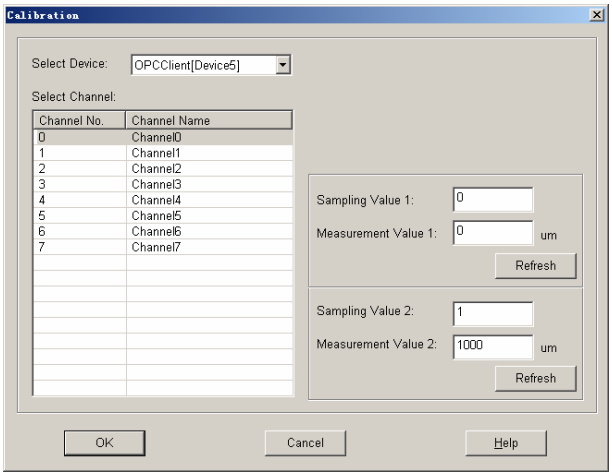
Take DTM as an example: Modbus proportional range: 0-16384. Full scale range: 0-0.5g. The calibration process is below:



1. Select Channel0;
2. Enter “0” in “Sampling Value 1”, and enter “0” in “Measurement Value 1”, later click **Refresh** button;
3. Enter “16384” in “Sampling Value 2”, and enter “0.5” in “Measurement Value 2”, later click **Refresh** button.

Calibrate OPC Client Device Channels

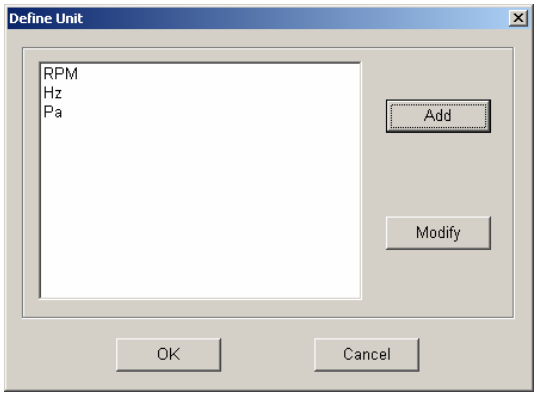
For an OPC Client device channel, if the unit of the data doesn’t match that of OPC Server, this OPC Client device channel must be calibrated. For example: data from OPC Server is measured by mm, but the unit of data for display is um. In this case, you should translate the mm into um.



1. Select the device channel you want to calibrate;
2. Type “0” in “Sampling Value 1” and “0” in “Measurement Value 1”, later click **Refresh** button;
3. Type “1” in “Sampling Value 2” and ”1000” in “Measurement Value 2”, later click **Refresh** button.

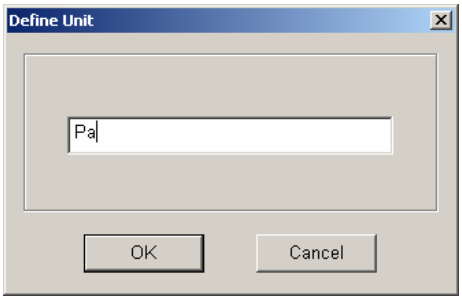
Define Unit

Click this command to open “Define Unit” window (ensure DAQ module on local DAQ Server is stopped). The function allows user to define units for Process measured channel. User can define up to 32 units.

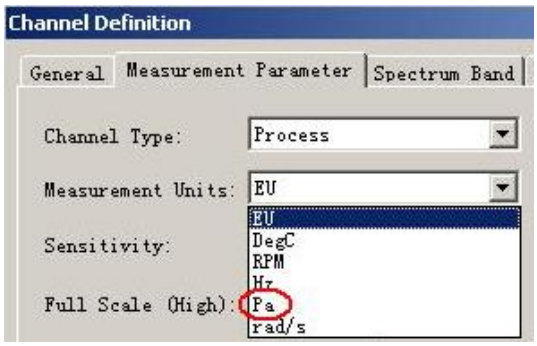


- **Add (Button)**

Add a process unit as your needs. Type the unit name in edit box and click **OK** button. The unit can be up to 10 characters long.



The user-defined unit will be shown on “Measurement Units” combo box when you configure a Process measured channel.



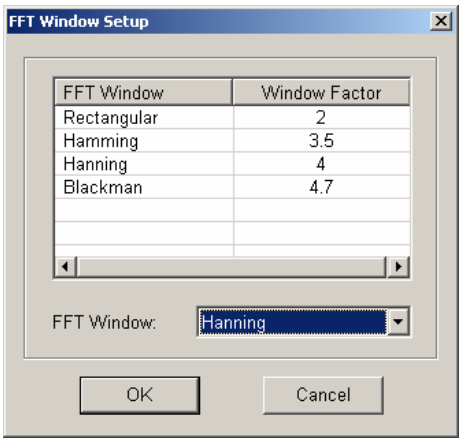
- **Modify (Button)**

Change the defined unit to another one. User is allowed to modify the defined units but can’t delete them.

Note that the user-defined units cannot be recognized by PCM360 system. So Metric Unit or English Unit conversion is not fit for the user-defined units.

FFT Window Setup

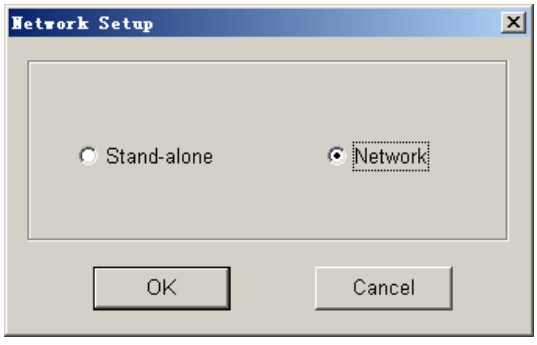
Click this command to open "FFT Window Setup" dialog box (ensure the DAQ module on local DAQ Server is stopped).



In this dialog box, you should select an appropriate window that will be applied to the waveform sample before it undergoes FFT analysis. The choices are: Rectangular, Hamming, Hanning, and Blackman. By default, PCM360 system will specify Hanning as the FFT window.

Network Setup

Click this command to change setting on network selection of PCM360 system (ensure DAQ module is stopped). The default is Network. If you want to change it to Stand-alone, select "Stand-alone" and then click **OK** button. Finally, re-start DAQ module on local DAQ Server.

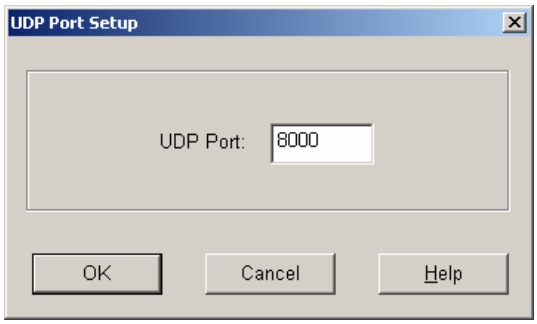


UDP Port Setup

Click this command to set the available UDP port (ensure the DAQ module is stopped). When the system UDP port is used by other application program, a message box will be launched to inform you.



Under this condition, you should assign another UDP port for PCM360 system. To re-set the UDP port, ensure the DAQ module is stopped.



Type the available UDP port in the edit box and click **OK** button.

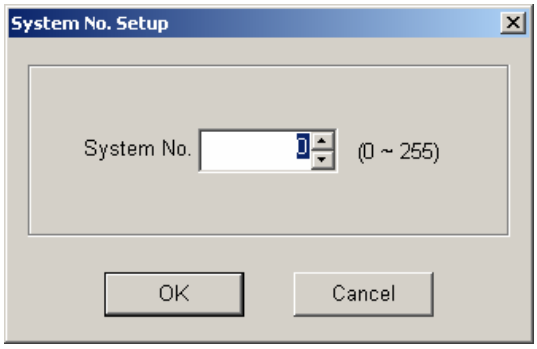
CAUTION: To apply the new UDP port, after re-set the system UDP port, you must exit PCM360 software (contains DAQ&COM, Display, Server, and Web Server) on all PCM360 Terminals, and then re-run them.

System No. Setup

Click this command to open “System No. Setup” window (ensure DAQ module is stopped).

System No.: It is used to identify the unique PCM360 system when there are multi-PCM360 systems in the same local network.

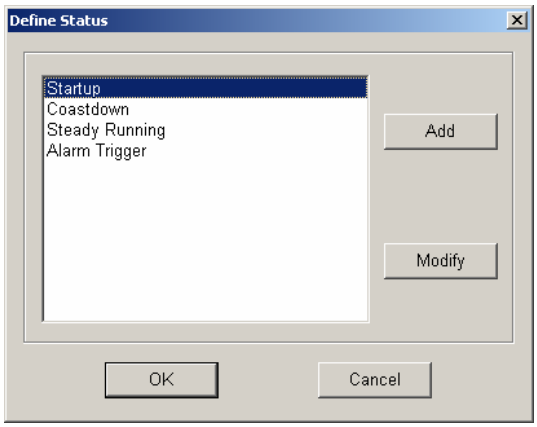
By default, the system No. will be set to “0”. If user wants to specify another No. for the current system, type the new number in the edit box, and then click **OK** button to save the number.



CAUTION: To apply the new system No., after re-specify the system No., you must exit PCM360 software (contains DAQ&COM, Display, Server, and Web Server) on all PCM360 Terminals, and then re-run them.

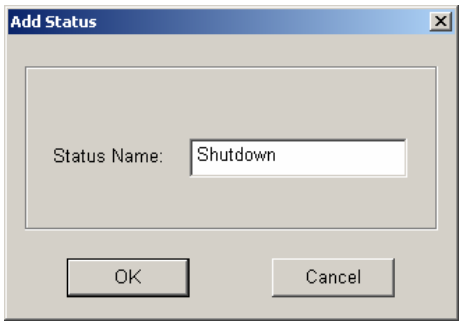
Define Status

Click this command to open "Define Status" window (ensure DAQ module is stopped). The function is used to define statuses for machine trains and samples. You are allowed to define up to 255 customized statuses.



- **Add (Button)**

Type the status name in edit box and then click **OK** button. The name can be up to 31 characters long.

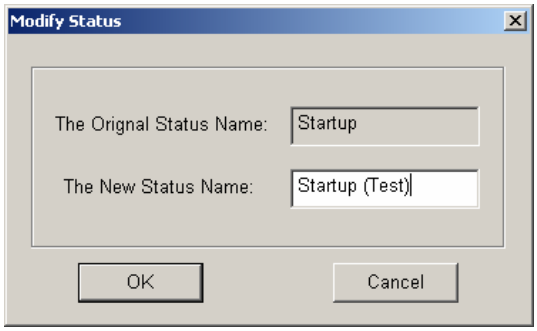


After added all statuses you need, user could set the status for the machine train and the available sample (dynamic and transient sample). See ***PCM360 DAQ Software Operation/Setup Menu/Machine Train's***

Status Setup; ***PCM360 Display Software Operation/Setup Menu/Machine Train's Status Setup***; ***PCM360 Display Software Operation/Operation Menu/Define Sample Status*** for details.

- **Modify (Button)**

Click this command to change the status name. Type the new name in edit box and then click **OK** button.



If the status name is changed, the new name will apply to the entire system.

- **OK (Button)**

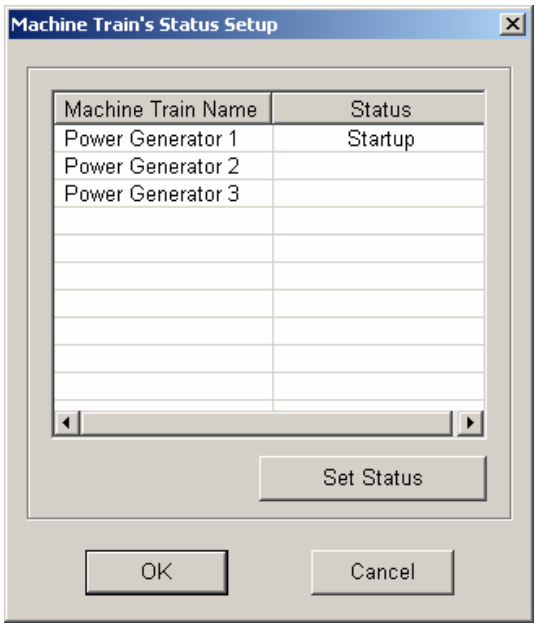
Click this button to save all changes information concerning status.

- **Cancel (Button)**

Click this button to exit the "Define Status" window without saving any changes.

Machine Train's Status Setup

Click this command to open "Machine Train's Status Setup" window. The function is used to set status for each machine train in PCM360 system.



- **Machine Train Name (List)**

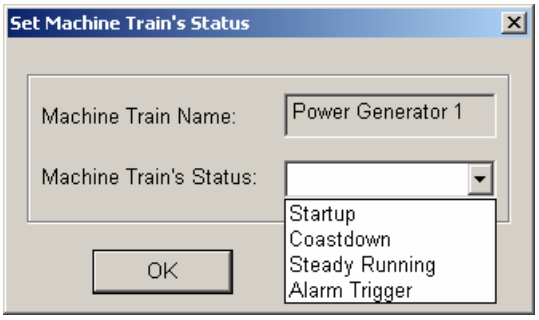
List all machine trains in current PCM360 system.

- **Status (List)**

List the status of the related machine train. You set the status for each machine train by clicking **Set Status** button. The machine train has no status before it is first set, and the status will be shown as empty.

- **Set Status (Button)**

Select a machine train from the list and click this button to specify a status for the current machine train. All statuses you added on “Define Status” window will be displayed in “Machine Train’s Status” combo box. See picture below:



When the machine train is triggered to collect data after the status was set, the collected data will be labeled this status. User on Display Terminal can view the historical data only with the specified status. See ***PCM360 Display Software Operation/User Menu/Select Status for Historical Data View*** for details.

Custom the picture of the device

Custom picture of the devices can be added to the device picture library of PCM360.

Select **Edit Device Picture** command from **Setup** menu, the PCM360 will start the Paint accessory. A bitmap file named ‘kong’ will be setup and the current directory will be assigned to the directory of the device picture of the PCM360 system (/PCM360/Picture).Draw the picture for a plant, train or machine, save and named the bitmap as your will, the extent device picture will be valid latterly.

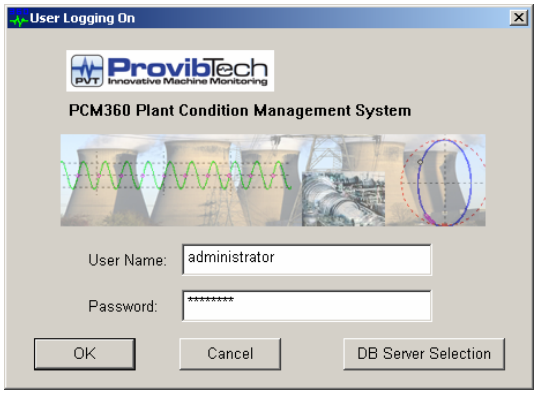
There is an alternate way to extend the device picture library: copy the custom picture of the device to the directory of the device picture of the PCM360 system (/PCM360/Picture) directly.

PCM360 Display Software Operation

Display software is a display and analysis software. It supports many plots and lists such as waveform, spectrum, full spectrum, shaft XY vibration, shaft XY vibration mode shape, trend, waterfall, shaft centerline, shaft centerline mode shape, bode, polar, cascade, full cascade, plots group, alarm event list, status list, and transient list. And also, it provides multiple analysis tools such as compensation analysis, contrast analysis, harmonic, sideband, etc. With these plots and analysis functions, user can analyze machine running status and make an effective plant asset management strategy.

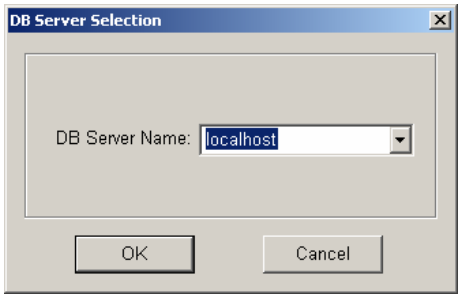
Run PCM360 Display Software

Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**PCM360 Display**. On "User Logging On" window, type the proper user name (default is "administrator") and password (default is "password"), and then click **OK** button.



DB Server Selection (Button)

Click this button to change the DB Server PCM360 Display software connects to.

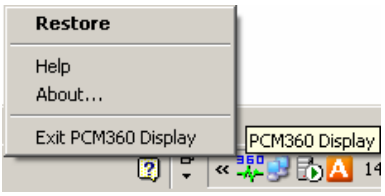


Type the name or IP address of DB Server, and click **OK** button.

PCM360 Display Tray

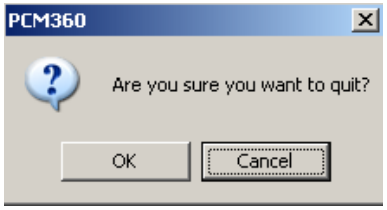
PCM360 Display software is a taskbar application and follows the standard behavior of taskbar applications. When Display software is minimized, its shortcut icon appears in the area of the taskbar clock on the right of the taskbar.

- ✓ To normally display the software, double click the task icon.
- ✓ To get the task shortcut menu, right click the task icon.



Restore: Select this command to normally display the software. It does the same work with double clicking the task icon.

Exit PCM360 Display: Select this command and message box shown below is launched. To exit the software, click **OK** button.



Note that when PCM360 Display is normally displayed, clicking the **close** button on the window does not terminate the application (but minimizes it to the taskbar).

File Menu

Print

The command is used to print the selected plot or list. Rest your mouse pointer on the selected plot or list, and then select **Print** command from **File** menu. To optimize the print effect, the plot or list window should be maximized before it is printed.

Print Preview

The command is used to preview a plot or list before it is printed. Rest your mouse pointer on the selected plot or list, and then select **Print Preview** command from **File** menu.

Print Setup

The command is used to set properties of the printer. Directly select **Print Setup** command from **File** menu.

Save as *.bmp

The command is used to save the current plot in the computer as .bmp format. Rest your mouse pointer on the selected plot, and then select **Save as *.bmp** command from **File** menu. To optimize the picture effect, we recommend that user adjusts the plot to a proper size before save it.

Close

Clicking this command doesn't exit the software but minimizes the software to the taskbar. To exit the software, right click the tray icon of the software and then select **Exit PCM360 Display** command.

User Menu

User Account Management

See ***PCM360 DAQ&COM SOFTWARE OPERATION/User Menu/User Account Management***.

Modify Password

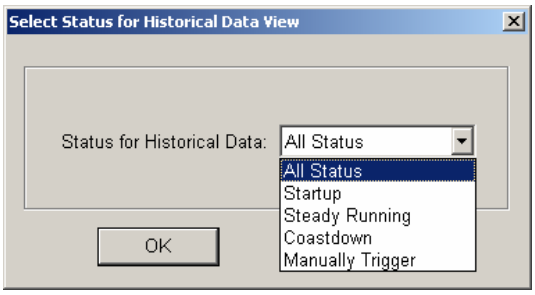
See ***PCM360 DAQ&COM SOFTWARE OPERATION/User Menu/Modify Password***.

Define PCM Explorer

See ***PCM360 DAQ&COM SOFTWARE OPERATION/User Menu/Define PCM Explorer***.

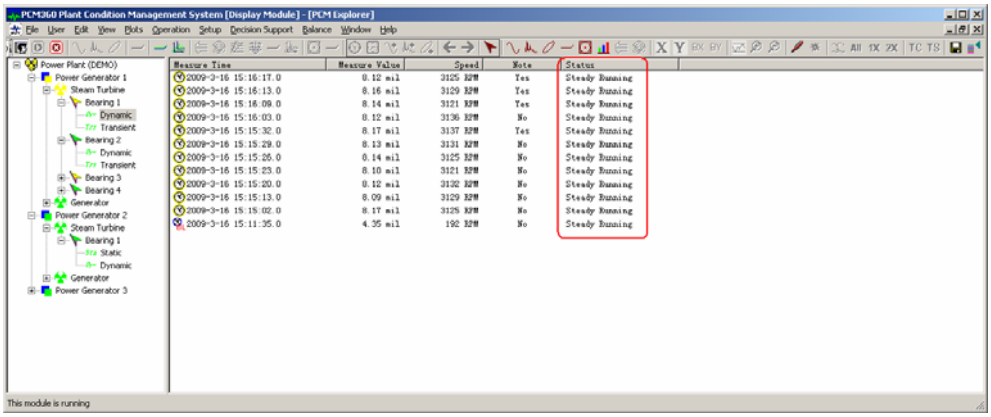
Select Status for Historical Data View

The function allows user to only view the historical data labeled the selected status. Click this command from **User** menu, and then “Select Status for Historical Data View” window is launched.



Status for Historical Data: List all data statuses user defined on “Define Status” window on PCM360 DAQ&COM software.

On “Select Status for Historical Data View” window, when a status is selected, all historical data (static, dynamic and transient) with this status will be displayed on Graphics View, and others will automatically be filtered out. For example: Select “Steady Running” status, and the software will only display the historical data with “Steady Running” status of all machine trains.



Moreover, most plots generated by these historical data will show the status on the plots. It is very convenient for user to analyze the data that have something in common and machine running status in some specific conditions.

NOTES:

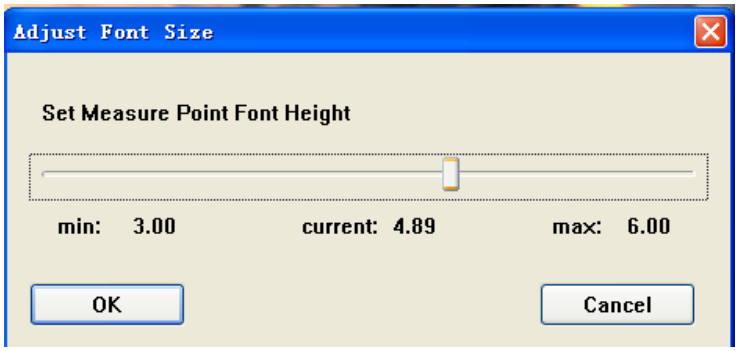
1. Display software will display historical data with all status by default when you first run the software.
2. The function applies to all machine trains in the system.

Unit Setup

See ***PCM360 DAQ&COM SOFTWARE OPERATION/User Menu/Unit Setup***.

Change the size of the font of the measurement points

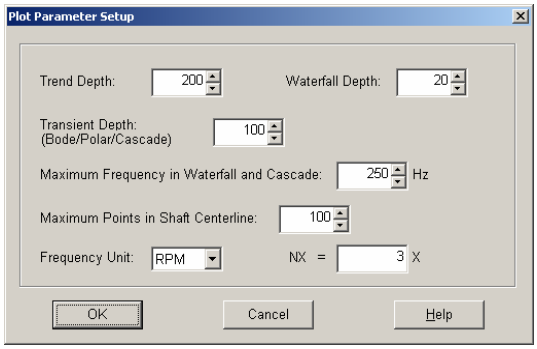
Select **Measure Point Font...** command from **User** menu, the dialog for adjusting the size of the font of the measurement points will pop up as follow:



Drag the slider and release, click the button OK, the size of the font of the measure points will change.

Plot Parameter Setup

Click this command and “Plot Parameter Setup” window is launched.



Trend Depth: It is the maximum number of the points that generate a trend plot. Maximum trend depth is 2000.

Waterfall Depth: It is the maximum number of the spectrum plots to be displayed on a waterfall plot. Maximum waterfall depth is 20.

Transient Depth (Bode/Polar/Cascade): For cascade, it is the maximum number of frequency spectra lines that generate a cascade plot; for bode and polar, it is the maximum number of points that generate the plot. Maximum Transient Depth is 300.

Maximum Frequency in Waterfall and Cascade: It is the maximum frequency domain on cascade and waterfall plot. Maximum value is 10000.

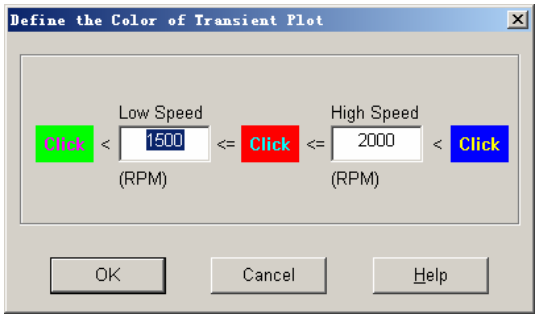
Maximum Points in Shaft Centerline: It is the maximum number of the points that generate a shaft centerline. Maximum value is 2000.

Frequency Unit: Set the units of frequency for display on related plots. The options are Hz, RPM, and NX.

NX: NX indicates the signal's components having frequencies equal to n times of the machine train's rated speed. N should be a real number between 0.001 and 10.

Define the Color of Transient Plot

Click this command and "Define the Color of Transient Plot" window is launched.



The window is used to assign colors for curves on transient plots taken over different speeds. There are three **Click** buttons on the window. Click any of them and then "Color" window pops up. The "Color" window provides 48 basic colors. To create a custom color, click **Define Custom Colors** button.

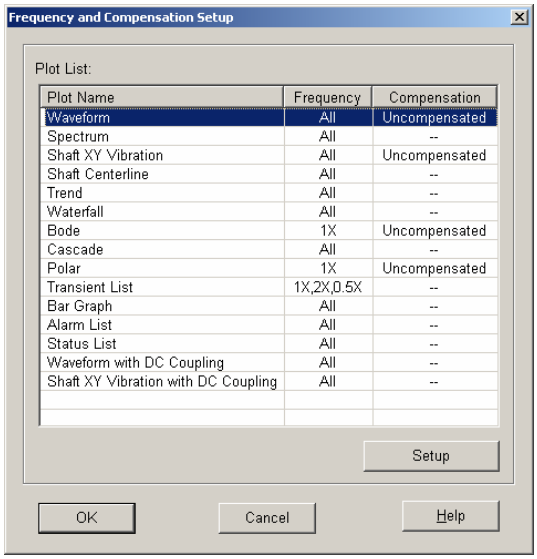


- **Click (Button from the left):** Assign a color for the curve on which the actual rotative speed of points is lower than "Low Speed".
- **Low Speed (Edit box):** Type the low rotative speed.

- **Click (Button in the middle):** Assign a color for the curve on which the actual rotative speed of points is between “Low Speed” and “High Speed”.
- **High Speed (Edit box):** Type the high rotative speed.
- **Click (Button from the right):** Assign a color for the curve on which the actual rotative speed of points is higher than “High Speed”.

Frequency and Compensation Setup

This command has two functions: one is to specify the signal’s frequency component that generated the plot; another is to set the particular plots to be compensated or uncompensated.


Frequency and Compensation Setup
Plot List:
Plot Name | Frequency | Compensation
Waveform | All | Uncompensated
Spectrum | All | --
Shaft XY Vibration | All | Uncompensated
Shaft Centerline | All | --
Trend | All | --
Waterfall | All | --
Bode | 1X | Uncompensated
Cascade | All | --
Polar | 1X | Uncompensated
Transient List | 1X,2X,0.5X | --
Bar Graph | All | --
Alarm List | All | --
Status List | All | --
Waveform with DC Coupling | All | --
Shaft XY Vibration with DC Coupling | All | --
Setup
OK
Cancel
Help

Plots supporting frequency component display:

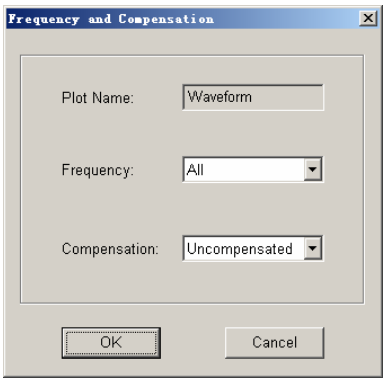
- ✓ Waveform
- ✓ Shaft XY Vibration
- ✓ Trend
- ✓ Bode
- ✓ Polar

Plots supporting compensation display:

- ✓ Waveform
- ✓ Shaft XY Vibration
- ✓ Bode

✓ Polar

From “Plot List”, select a plot and then click **Setup** button. This button is disabled when select spectrum, shaft centerline, waterfall, cascade, transient list, bar graph, alarm list, status list, waveform with DC Coupling and shaft XY vibration with DC Coupling. Below is the “Frequency and Compensation” window.



■ **Frequency Setup**

✓ **All:** In a complex vibration signal, notation for signal with all frequencies components.

✓ **1X:** In a complex vibration signal, notation for the signal component that occurs at the actual rotative speed frequency.

✓ **2X:** In a complex vibration signal, notation for signal component having frequencies equal to two times of actual rotative speed frequency.

✓ **NX:** In a complex vibration signal, notation for signal component having frequencies equal to N times of actual rotative speed frequency while N is user definable.

✓ **NOT1X:** In a complex vibration signal, notation for signal components with 1X frequency component filtered out.

■ **Compensation Setup**

Compensation is to subtract slow-roll from sample before it is plotted. To compensate the plot, following preconditions must be matched:

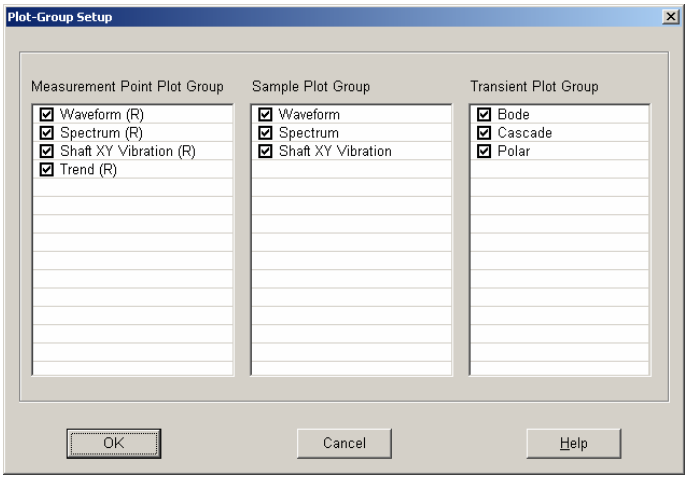
✓ The related measurement point must map the phase reference channel.

✓ The related measurement point must be defined slow-roll sample.

✓ The slow-roll sample must be at least one full cycle.

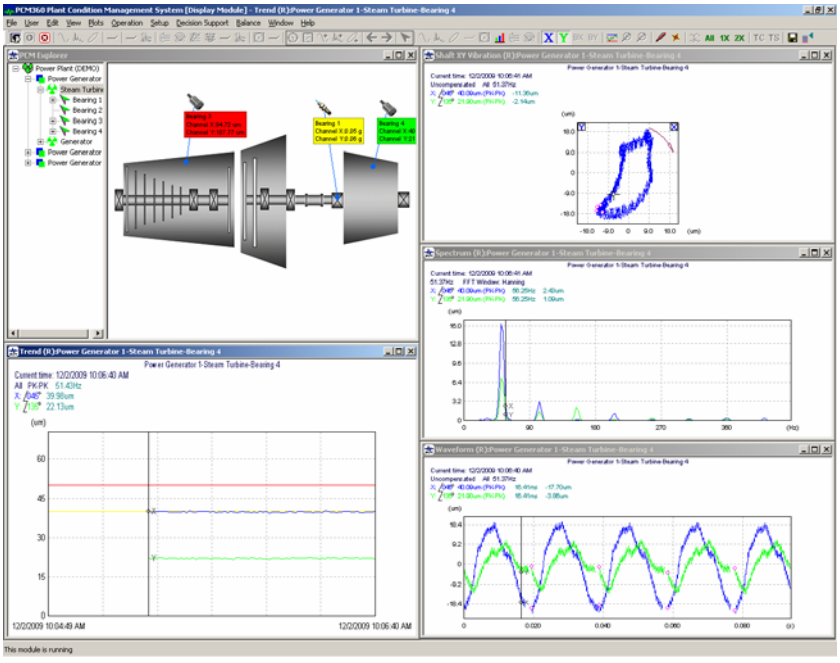
Plot-Group Setup

Click this command and “Plot-Group Setup” window is launched.



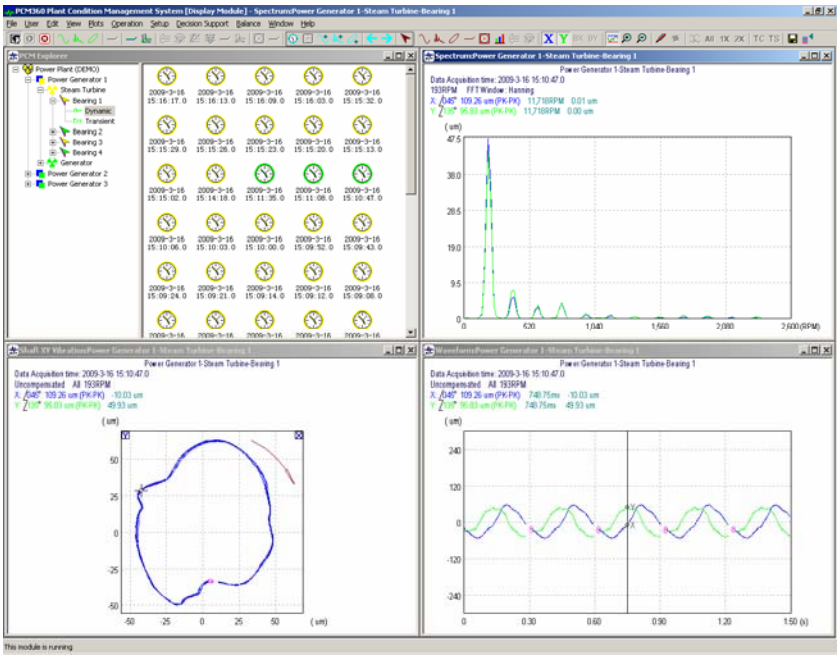
- **Measurement Point Plot Group**

To display the plots on the measurement point’s plot group window, please mark the check box before the plots. Available options are waveform(R), spectrum(R), shaft XY vibration(R), and trend(R). Picture below shows a measurement point’s plot group window.



- **Sample Plot Group**

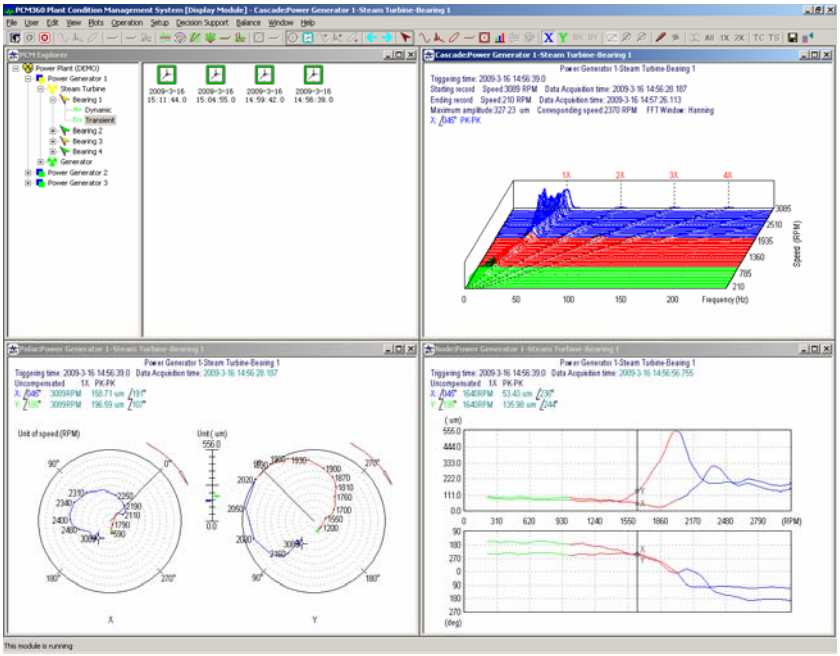
To display the plots on the sample’s plot group window, please mark the check box before the plots. Available options are waveform, spectrum, and shaft XY vibration. Picture below shows a sample’s plot group window.



- **Transient Plot Group**

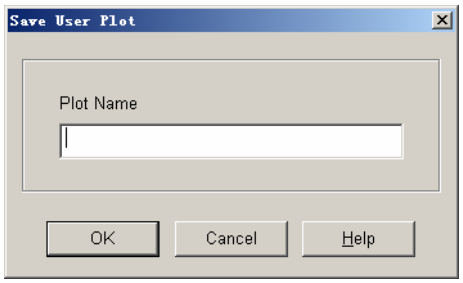
To display the plots on the transient samples' plot group window, please mark the check box before the plots.

Available options are bode, cascade and polar. Picture below shows a transient samples' plot group window.



Save User Plot

This command is used to save user-defined window and the information about the window will be saved to the database. After finished the window setting, select **Save User Plot** command (or directly click the shortcut icon on toolbar) from **User** menu and then "Save User Plot" window is launched.



Name the plot and then click **OK** button.

NOTES:

1. Maximum 8 customized windows can be defined. If there are already 8 windows and you save another, the first window will be replaced by the ninth one (FIFO).
2. When save a customized plot, the current status of the historical data you select to view will be recorded. It will be displayed behind the plot name.

Open User Plot

This command is used to open a saved user-defined plot. Select **Open User Plot** command from **User** menu (or directly click shortcut icon on toolbar) and then select the available plot from the saved plot list.



When you click **Open User Plot** command, all saved plots will be displayed, and meanwhile, the status of the historical data for view when you saved the plot is also displayed behind the plot name. **Note** that you are only allowed to open plots marked the same status as current status of the historical data you select to view. For example, you saved a plot marked "Startup" status, when current status of the historical data for view is also "Startup", you could view the plot. The plots marked other statuses can't be opened.

Refresh PCM Explorer

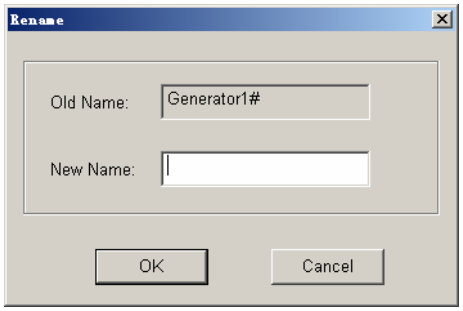
This command is used to refresh the PCM Explorer. To refresh the current PCM Explorer, make sure the

Display Terminal is started.

Edit Menu

Rename

Use this command to change name of the machine train, machine, and measurement point displayed on PCM Explorer. Select a machine train (machine, measurement point) from tree view, and select **Rename** command from **Edit** menu (or right click this node and select **Rename** command from shortcut menu), and then type the new name on “Rename” window shown below, and later click **OK** button.



To apply the new name, you should refresh the PCM Explorer.

NOTE: The command doesn’t apply to plants.

Delete

Use this command to delete machine train, machine, and measurement point from the current PCM Explorer. Select the machine train (machine, measurement point) from tree view and then select **Delete** command from **Edit** menu (or right click this node and select **Delete** command from shortcut menu). To apply the changed setting, please refresh the PCM Explorer. **Note** that the node is deleted from the current PCM Explorer, rather than from the whole system, so the deleted node can be recovered. Also this command doesn’t apply to plants.

- ***How to recover the nodes deleted from PCM Explorer?***

Case 1: The deleted node is a machine train.

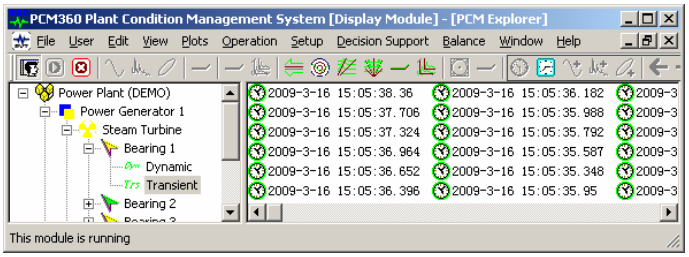
Answer: Open “Define PCM Explorer” window. The deleted machine train is displayed on “Available Machine Train” field. Move the machine train to “Selected Machine Train” field and click **OK** button to close the window. After the PCM Explorer is refreshed, the machine train will be displayed on the current PCM Explorer again.

Case 2: The deleted node is a machine or a measurement point.

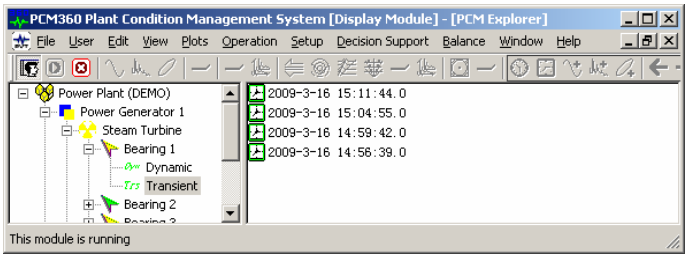
Answer: Open “Define PCM Explorer” window. The machine train that the machine or measurement point is related to is displayed on “Selected Machine Train” field. Move the machine train to “Available Machine Train” field and click **OK** button to close the window. Then open “Define PCM Explorer” window again and move the machine train from “Available Machine Train” field to “Selected Machine Train” field, and then click **OK** button. After the PCM Explorer is refreshed, the deleted machine or measurement point will be displayed on the current PCM Explorer again.

Back

Use this command to back to **Transient Trigger Record List View** from **Transient Data List View**. Rest the mouse pointer on a **Transient Data List View**. See picture below:



Select **Back** command from **Edit** menu. See picture below:



View Menu

Toolbar

: Show or hide PCM Explorer. It has the same function with **PCM Explorer** command from **View** menu.

: Start Display module. It has the same function with **Start Display Terminal** command from **Operation** menu.

: Stop Display module. It has the same function with **Stop Display Terminal** command from **Operation** menu.

Shortcut icons for historical plots:

 : Display historical waveform plot. It has the same function with **Waveform** command from **Plots** menu.

 : Display historical spectrum plot. It has the same function with **Spectrum** command from **Plots** menu.

 : Display historical shaft XY vibration plot. It has the same function with **Shaft XY Vibration** command from **Plots** menu.

Shortcut icons for static plot:

: Display historical static trend plot. It has the same function with **Trend (Sta)** command from **Plots** menu.

Shortcut icons for dynamic plots:

: Display historical dynamic trend plot. It has the same function with **Trend (Dyn)** command from **Plots** menu.

 : Display historical dynamic waterfall plot. It has the same function with **Waterfall (Dyn)** command from **Plots** menu.

Shortcut icons for transient plots:

 : Display historical transient bode plot. It has the same function with **Bode** command from **Plots** menu.

 : Display historical transient polar plot. It has the same function with **Polar** command from **Plots** menu.

 : Display historical transient cascade plot. It has the same function with **Cascade** command from **Plots** menu.

 : Display historical transient full cascade plot. It has the same function with **Full Cascade** command from **Plots** menu.

: Display historical transient trend plot. It has the same function with **Trend (Trs)** command from **Plots** menu.

 : Display historical transient waterfall plot. It has the same function with **Waterfall (Trs)** command from **Plots** menu.

Shortcut icons for historical plots of both dynamic data and transient data:

 : Display historical shaft centerline plot that is generated by both dynamic data and transient data. It has the same function with **Shaft Centerline (H)** command from **Plots** menu.

: Display historical trend plot that is generated by both dynamic data and transient data. It has the same function with **Trend (H)** command from **Plots** menu.

Shortcut icons for plot-group:

 : Display plot group of a sample. It has the same function with **Plot Group/Sample** command from **Plots** menu.

 : Display plot group of transient data. It has the same function with **Plot Group/Transient Sample** command from **Plots** menu.

 : Display plot group of waveform plots. It has the same function with **Plot Group/Waveforms** command from **Plots** menu.

 : Display plot group of spectrum plots. It has the same function with **Plot Group/Spectrums** command from **Plots** menu.

 : Display plot group of shaft XY vibration plots. It has the same function with **Plot Group/Shaft XY Vibration** command from **Plots** menu.

 : View plot group of the previous item. It has the same function with **Previous** command from **View** menu.

 : View plot group of the next item. It has the same function with **Next** command from **View** menu.

 : Display plot group of the measurement point. It has the same function with **Plot Group/Measurement Point** command from **Plots** menu.

Shortcut icons for real-time plots:

 : Display real-time waveform plot. It has the same function with **Waveform (R)** command from **Plots** menu.

 : Display real-time spectrum plot. It has the same function with **Spectrum (R)** command from **Plots** menu.

 : Display real-time shaft XY vibration plot. It has the same function with **Shaft XY Vibration (R)** command from **Plots** menu.

: Display real-time trend plot. It has the same function with **Trend (R)** command from **Plots** menu.

 : Display real-time shaft centerline plot. It has the same function with **Shaft Centerline (R)** command from **Plots** menu.

 : Display bar graph. It has the same function with **Bar Graph** command from **Plots** menu.

 : Display real-time bode plot. It has the same function with **Bode (R)** command from **Plots** menu.

 : Display real-time polar plot. It has the same function with **Polar (R)** command from **Plots** menu.

Shortcut icons for channels:

 : Display or hide plot of channel X. It has the same function with **Channel X** command from **View** menu.

 : Display or hide plot of channel Y. It has the same function with **Channel Y** command from **View** menu.

 : Display or hide plot generated by baseline data of channel X. It has the same function with **Baseline X** command from **View** menu.

 : Display or hide plot generated by baseline data of channel Y. It has the same function with **Baseline Y** command from **View** menu.

Other shortcut icons:

 : Auto full scales a plot. It has the same function with **Auto Full Scale** command from **View** menu.

 : Zoom in a plot. It has the same function with **Plot Magnify** command from **View** menu.

 : Restore a magnified plot to original size. It has the same function with **Plot Original** command from **View** menu.

 : Start static and/or dynamic data collection by manual. It has the same function with **Start Static and Dynamic Data Acquisition** command from **Operation** menu.

 : Acknowledge the alarm. It has the same function with **Acknowledge Alarm** command from **Operation** menu.

 : Compensate or un-compensate a plot. It has the same function with **Compensated** command from **View** menu.

 : Display plot with all frequency components. It has the same function with **All Frequency** command from **View** menu.

 : Display plot with 1X frequency component. It has the same function with **1X** command from **View** menu.

 : Display plot with 2X frequency component. It has the same function with **2X** command from **View** menu.

 : Display a hidden “List of Transient (Data Collecting)” window. It has the same function with **Show Transient Collection List** command from **View** menu.

 : Display a hidden “List of Transient (Data Storing)” window. It has the same function with **Show Transient Storage List** command from **View** menu.

 : Save a user-defined window. It has the same function with **Save User Plot** command from **User** menu.

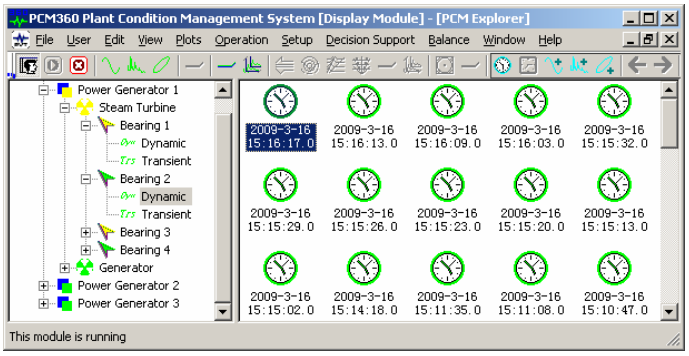
 : Open a user-defined window. It has the same function with **Open User Plot** command from **User** menu.

Status Bar

Activate or deactivate the status bar displaying at the bottom of the screen. This display usually contains additional information about the function or feature the mouse pointer is resting on.

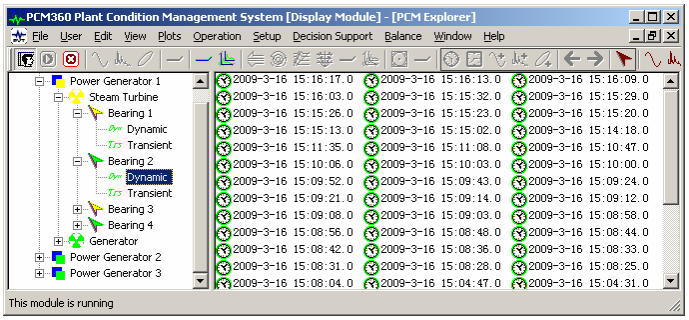
Big Icon

Display (static, dynamic, and transient) samples or trigger records by big icon. Rest your mouse pointer on a **Data List View** or a **Transient Trigger Record List View**, and select **Big Icon** command from **View** menu (or right click anywhere on the view and then select **View/Big Icon** from shortcut menu).



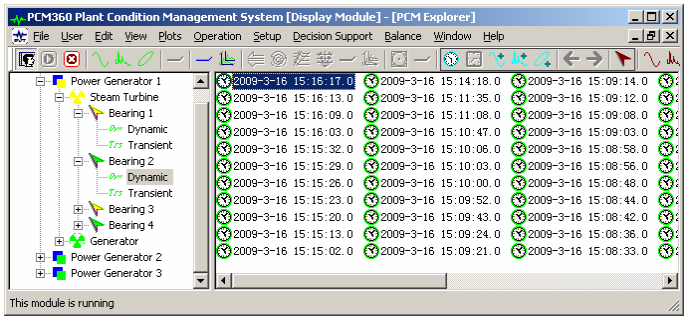
Small Icon

Display (static, dynamic, and transient) samples or trigger records by small icon. Rest your mouse pointer on a **Data List View** or a **Transient Trigger Record List View**, and select **Small Icon** command from **View** menu (or right click anywhere on the view and then select **View/Small Icon** from shortcut menu).



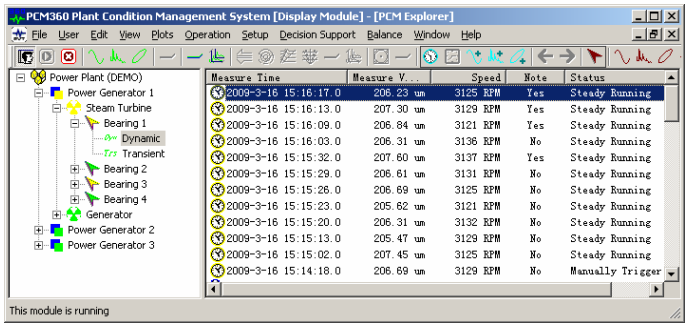
List

List (static, dynamic, and transient) samples or trigger records by order of the collected time. Rest your mouse pointer on a **Data List View** or a **Transient Trigger Record List View**, and select **List** command from **View** menu (or right click anywhere on the view and then select **View/List** from shortcut menu).



Details

List (static, dynamic, and transient) samples or trigger records by order of the collected time. The detailed information of samples or trigger records is also displayed. Rest your mouse pointer on a **Data List View** or a **Transient Trigger Record List View**, and select **Details** command from **View** menu (or right click anywhere on the view and then select **View/Details** from shortcut menu).



PCM Explorer

Use this command to hide or display PCM Explorer. The PCM Explorer of PCM360 system mainly consists of **Tree View** and **Graphics View**.

Tree View

See ***PCM360 DAQ&COM SOFTWARE OPERATION/View Menu/PCM Explorer/Tree View*** of this manual.

Graphics View

PCM360 system features three different levels of alarm severity. The color of picture bars indicates the real-time alarm status of the related measurement point, machine, and machine train.

✓ **Red:** Danger status.

- ✓ **Yellow:** Alert status.
- ✓ **Green:** Normal status.

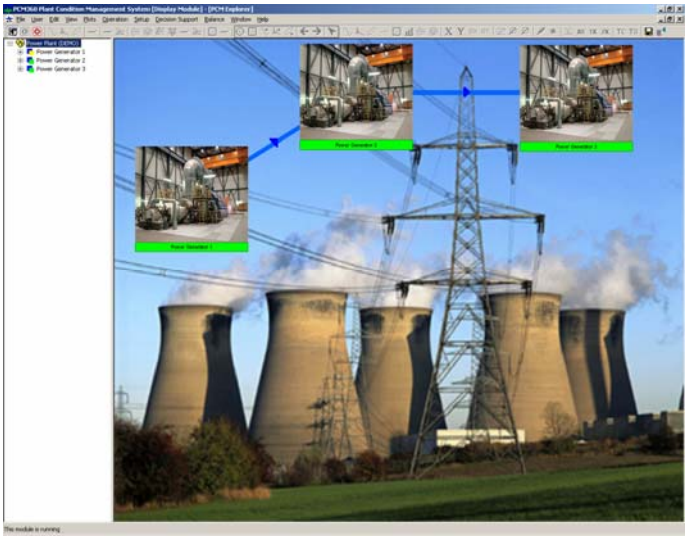
Status of the picture bars:

- ✓ **Flashing:** The related measurement point has ever alarmed and the alarm was not acknowledged yet.
- ✓ **Solid:** No alarm occurs or the alarm has been acknowledged on the related measurement point, machine and machine train.

If the color of a measurement point picture bar shows flashing green, it indicates that currently the measurement point is in normal status but the measurement point has ever alarmed and you haven't acknowledged the alarm on this measurement point.

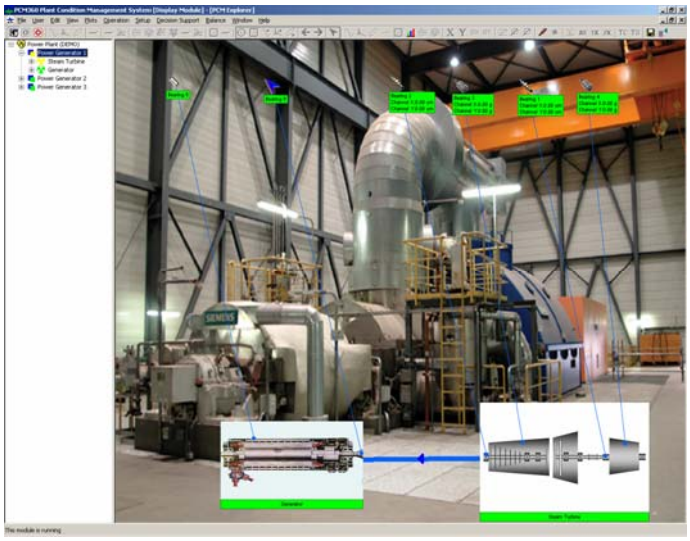
PCM360 Display Graphics View displays seven types of graphics:

- **Plant-Machine train View:** Directly select a plant from tree view.

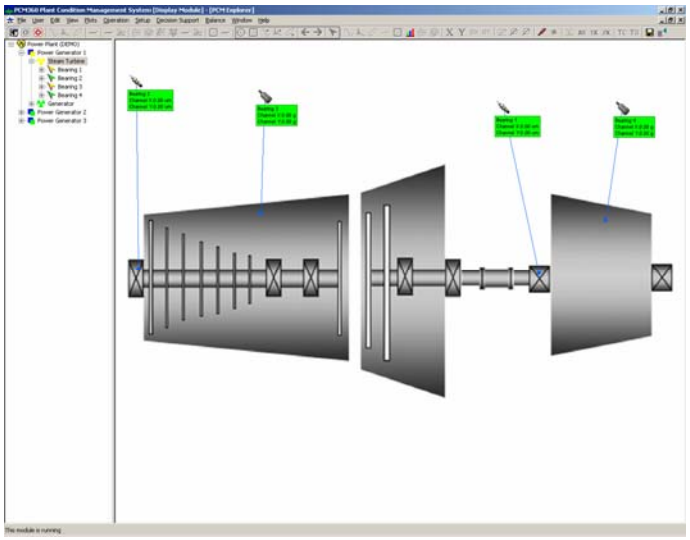


Different from the **Plant-Machine train View** on DAQ&COM software, you can't edit machine trains' pictures on Display's **Plant-Machine train View**.

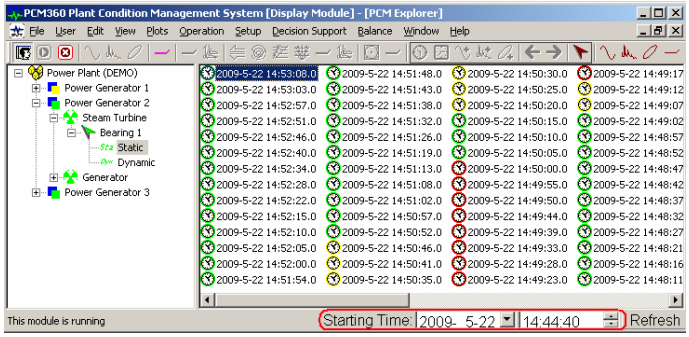
- **Machine train-Machine View:** Directly select a machine train from tree view or double click a machine train picture on **Plant-Machine train View**. Picture below shows the **Machine train-Machine View** with all measurement points shown. Also different from the **Machine train-Machine View** on DAQ&COM software, you can't edit machines' pictures on Display's **Machine train-Machine View**.



- **Machine-Measurement point View:** Directly select a machine from tree view or double click a machine picture on **Machine train-Machine View**.



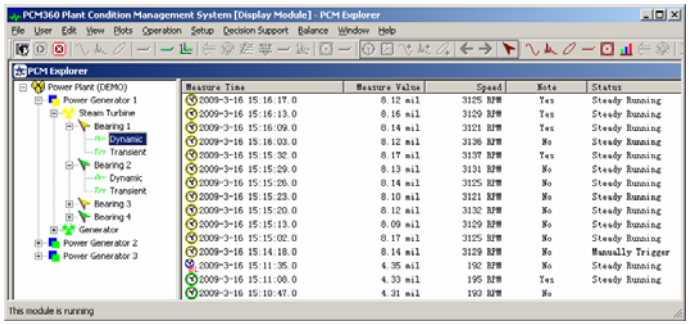
- **Static Data List View:** From tree view, directly select the “Static” under the measurement point. Picture below shows a static data list view arranged by List.



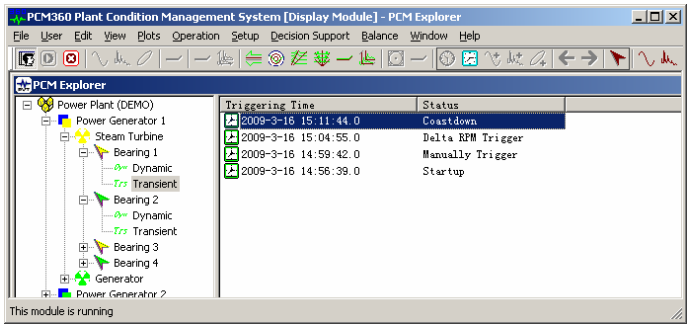
From **Static Data List View**, you can set the starting time of the display samples. Once you selected the

starting time of the static samples, the Display will show the latest 2000 static samples from the time.

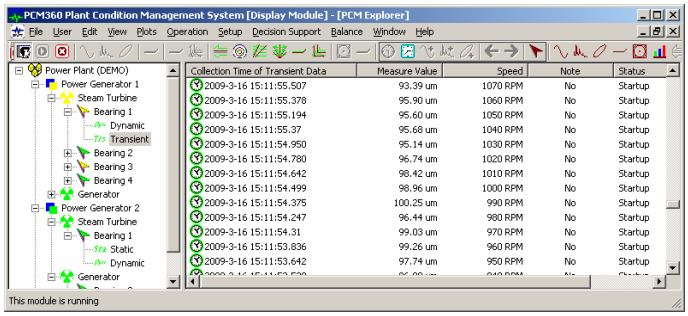
- **Dynamic Data List View:** From tree view, directly select the “Dynamic” under the measurement point. Picture below shows a dynamic data list view arranged by Details.



- **Transient Trigger Record List View:** From tree view, directly select the “Transient” under the measurement point. Picture below shows a transient trigger record list view arranged by Details.



- **Transient Data List View:** From **Transient Trigger Record List View**, double click a trigger record. Picture below shows the transient data list view arranged by Details.

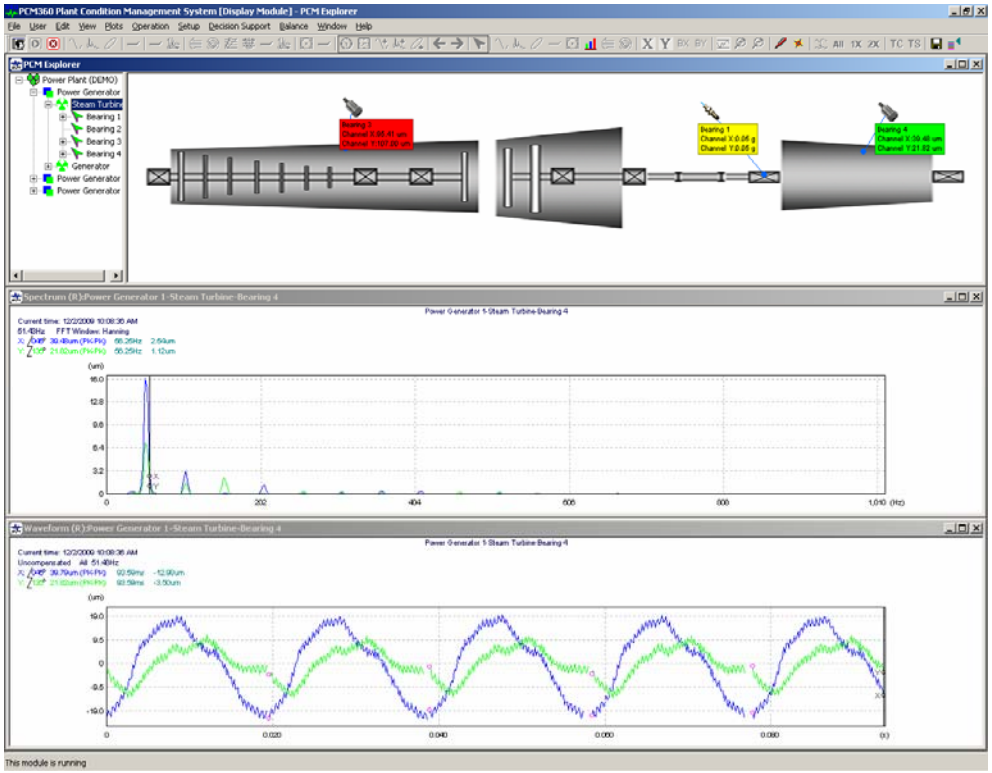

PCM360 Plant Condition Management System [Display Module] - [PCM Explorer]
File User Edit View Plots Operation Setup Decision Support Balance Window Help
Power Plant (DEMO)
Power Generator 1
Steam Turbine
Bearing 1
Dynamic
Transient
Bearing 2
Bearing 3
Bearing 4
Generator
Power Generator 2
Steam Turbine
Bearing 1
Static
Dynamic
Generator
Collection Time of Transient Data
Measure Value
Speed
Note
Status
2009-3-16 15:11:55.507 93.39 um 1070 RPM No Startup
2009-3-16 15:11:55.378 95.90 um 1060 RPM No Startup
2009-3-16 15:11:55.194 95.60 um 1050 RPM No Startup
2009-3-16 15:11:55.37 95.68 um 1040 RPM No Startup
2009-3-16 15:11:54.950 95.14 um 1030 RPM No Startup
2009-3-16 15:11:54.780 96.74 um 1020 RPM No Startup
2009-3-16 15:11:54.642 98.42 um 1010 RPM No Startup
2009-3-16 15:11:54.499 98.96 um 1000 RPM No Startup
2009-3-16 15:11:54.375 100.25 um 990 RPM No Startup
2009-3-16 15:11:54.247 96.44 um 980 RPM No Startup
2009-3-16 15:11:54.31 99.03 um 970 RPM No Startup
2009-3-16 15:11:53.836 99.26 um 960 RPM No Startup
2009-3-16 15:11:53.642 97.74 um 950 RPM No Startup
This module is running

To return to the **Transient Trigger Record List View**, you should select **Back** command from **Edit** menu (or right click anywhere on the **Transient Data List View**, and then select **Back** command from the shortcut menu).

Other functions:

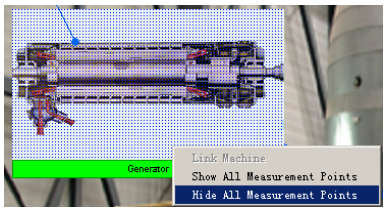
- ***Display a measurement point’s waveform plot and spectrum plot***

Answer: Ensure both the Display and DAQ modules are started. On Graphics View double click the picture of the available measurement point, and then the real-time waveform and spectrum plots of this measurement point will be displayed. Note that only the measurement point that maps Acceleration, Velocity, or Vibration [from Prox] channel of DAQ cards and DW devices supports this function.



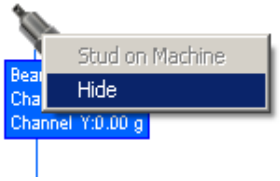
- ***Hide or show all measurement points beneath the machine***

Answer: On **Machine train-Machine View** or **Machine-Measurement point View**, right click the machine picture and select **Hide All Measurement Points** or **Show All Measurement Points** command from shortcut menu.



- ***Hide a single measurement point beneath the machine***

Answer: On **Machine train-Machine View** or **Machine-Measurement point View**, right click the picture of the measurement point and select **Hide** command from shortcut menu.

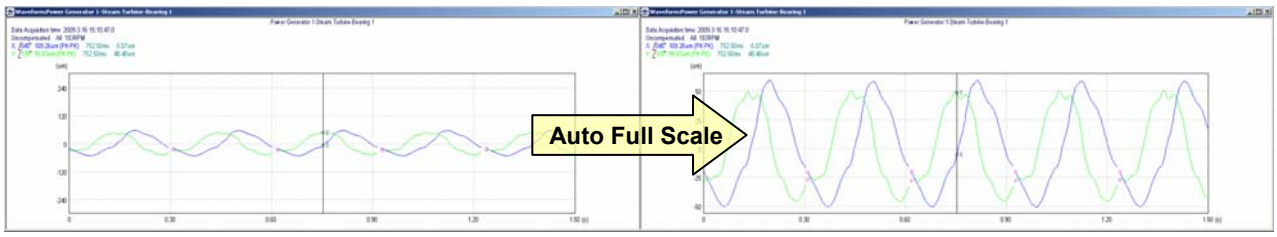


Auto Full Scale

The function is used to automatically adjust the scales for plots and best display the selected data. Following plots support the auto full scale display:

- ✓ Waveform
- ✓ Waveform with DC Coupling
- ✓ Spectrum
- ✓ Full spectrum
- ✓ Shaft XY Vibration
- ✓ Shaft XY Vibration with DC Coupling
- ✓ Shaft centerline
- ✓ Trend
- ✓ Waterfall
- ✓ Shaft XY Vibration mode shape

Auto full scale a plot: Rest the mouse pointer on an available plot window and select **Auto Full Scale** command from **View** menu (or directly click shortcut icon on toolbar).



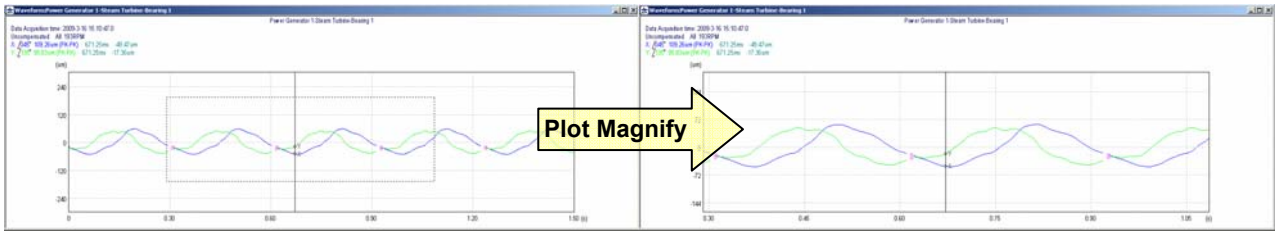
Plot Magnify

The function is used to zoom in plots as your needs. Following plots support this function:

- ✓ Waveform
- ✓ Waveform with DC Coupling

- ✓ Spectrum
- ✓ Full spectrum
- ✓ Trend (real-time trend is not contained)

Magnify the curve on plot: Rest the mouse pointer on an available plot and select **Plot Magnify** from **View** menu (or directly click shortcut icon on toolbar), and then left click the mouse and drag a rectangle on the plot. After that, the curve in the rectangle will be magnified to the size of the plot range.



Plot Original

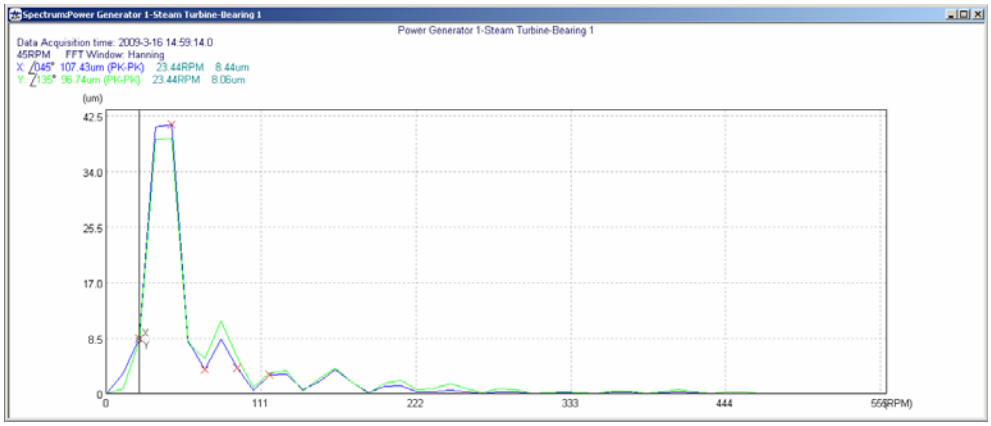
The function is used to restore the magnified plot to the original size.

Restore the magnified plot: Rest the mouse pointer on the magnified plot, and then select **Plot Original** command from **View** menu (or directly click on toolbar). After that, the magnified plot will be restored to the original size.

Harmonics

Use this command to find five points of which frequencies equal integral multiplies of the selected point's frequency.

Display harmonics on spectrum plot: Rest your mouse pointer on a spectrum plot and select **Harmonics** from **View** menu (or right-click the mouse pointer and select **Harmonics** from shortcut menu), and then specify a point on the plot. See picture below: all harmonics cursors are crossed with red symbol "X".



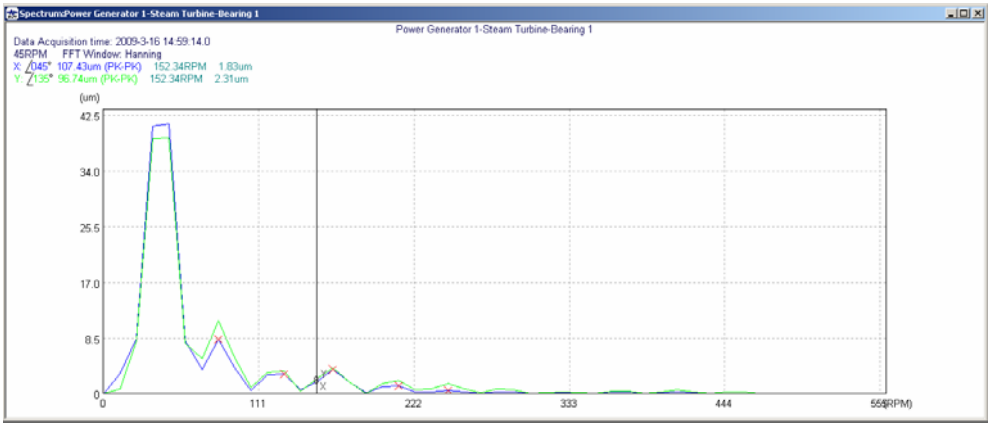
NOTES:

1. Press Left or Right key on keyboard to select different point on the curve.
2. On the spectrum plot, harmonic and sideband can't be displayed at the same time.
3. If the harmonic is beyond the display range of spectrum plot, it won't be shown. Therefore, sometimes you can't view the whole five harmonic cursors.

Sideband

Use this command to find the PK point which is nearest to the selected point in a lateral direction. And take this PK point as the center to find another four PK points with two on the left and two on the right beside the center PK point.

Display sideband on spectrum plot: Rest your mouse pointer on a spectrum plot and select **Sideband** from **View** menu (or right-click the mouse pointer and select **Sideband** from shortcut menu), and then select a point on the plot. See picture below: all sideband cursors are crossed with red symbol "X".



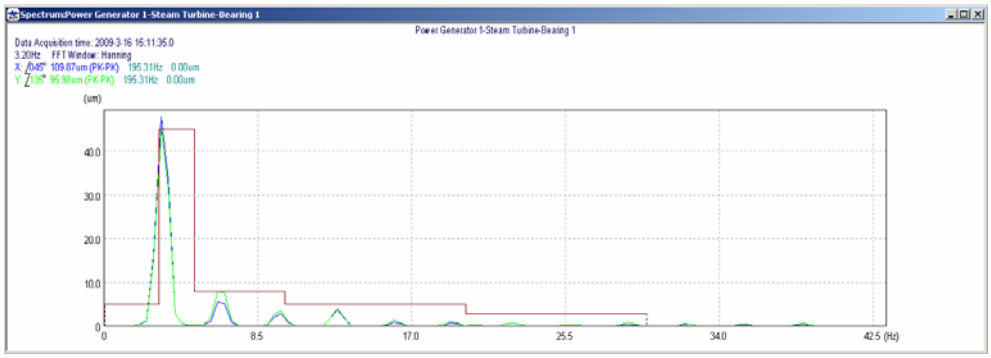
NOTES:

1. Press Left or Right key on keyboard to select different point on the curve.

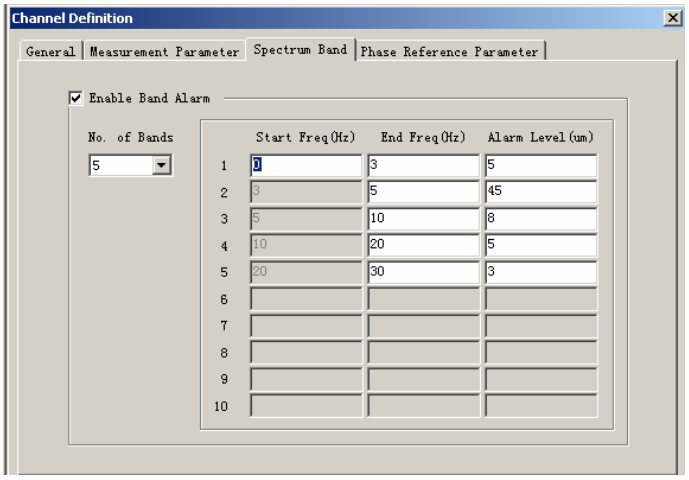
2. On the spectrum plot, harmonics and sideband can't be displayed at the same time.
3. If the sideband is beyond the display range of spectrum plot, it won't be shown. Therefore, sometimes you can't view the whole five sideband cursors.

Band Alarm Line

The function allows user to view band alarm lines of DAQ card's Acceleration, Velocity, or Vibration [from Prox] channel on a spectrum plot. Rest the mouse pointer on the spectrum plot and select **Band Alarm Line** from **View** menu (or right-click the mouse pointer and select **Band Alarm Line** from shortcut menu).



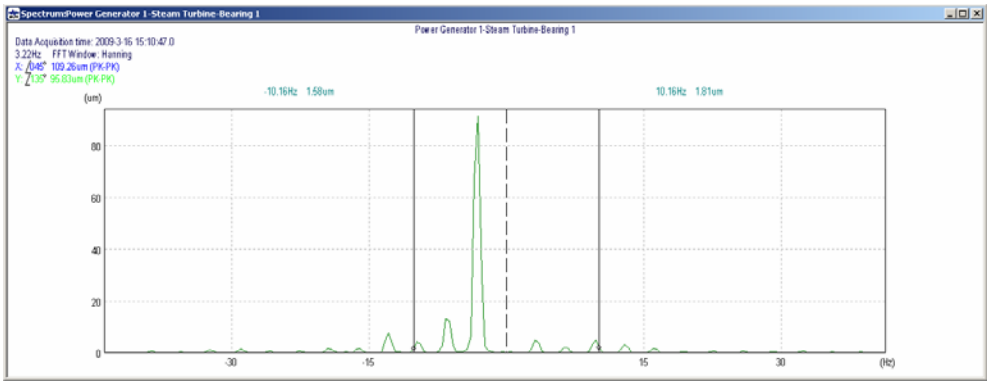
NOTE: To display band alarm lines on the spectrum plot, ensure the channel mapped this measurement point has set the band alarm information (on **Spectrum Band** tab of "Channel Definition" window). Or else the **Band Alarm Line** command is disabled.



Full Spectrum

Use this command to view the full spectrum plot that is generated by data from both channel X and channel Y to calculate the amplitudes of the forward and reverse (backward) frequency components.

Rest the mouse pointer on the spectrum plot, and then select **Full Spectrum** from **View** menu (or right click anywhere and select **Full Spectrum** from shortcut menu). Picture below shows a full spectrum plot.



NOTE: Only dual-channel measurement point that has mapped the DAQ card's Acceleration, Velocity, and Vibration [from Prox] channel can generate the full spectrum plot. Make sure the two measurement point channels mapped the same type of DAQ channel.

Channel X

The function is used to display or hide the plot that is generated by data from channel X of a measurement point. Its short icon on toolbar is X.

Make sure the channel X has mapped the DAQ channel. Following plots support the Channel X display:

- ✓ Waveform
- ✓ Waveform with DC Coupling
- ✓ Spectrum
- ✓ Trend
- ✓ Waterfall
- ✓ Bode
- ✓ Half cascade
- ✓ Polar

When you view plots above, the plot with Channel X will be displayed by default.

Channel Y

The function is used to display or hide the plot that is generated by data from channel Y of a measurement point. Its shortcut icon on toolbar is Y.

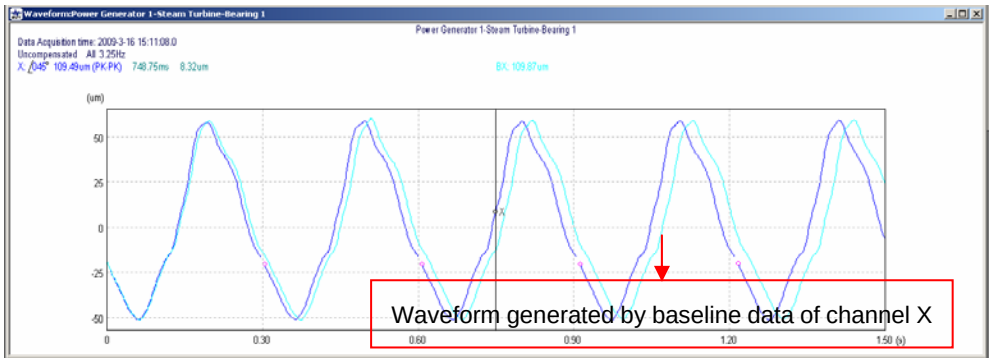
Make sure the channel Y has mapped the DAQ channel. Following plots support the Channel Y display:

- ✓ Waveform
- ✓ Waveform with DC Coupling
- ✓ Spectrum
- ✓ Trend
- ✓ Waterfall
- ✓ Bode
- ✓ Half cascade
- ✓ Polar

Baseline X

The command is used to view the baseline sample's plot of channel X. It is enabled only when the baseline sample under the related measurement point is defined and the measurement point's Channel X has mapped DAQ channel. Its shortcut icon on toolbar is BX.

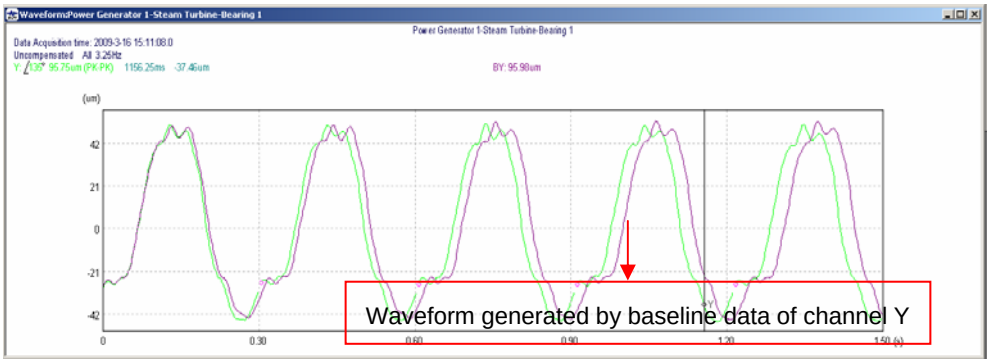
Rest the mouse pointer on a historical waveform plot or spectrum plot, and then select **Baseline X** from **View** menu (or directly click BX on toolbar).



Baseline Y

The command is used to view the baseline sample's plot of channel Y. It is enabled only when the baseline sample under the related measurement point is defined and the measurement point's channel Y has mapped DAQ channel. Its shortcut icon on toolbar is BY.

Rest the mouse pointer on a historical waveform plot or spectrum plot, and then select **Baseline Y** from **View** menu (or directly click BY on toolbar).



Compensated

Use this command to compensate or un-compensate a plot. Its shortcut icon on toolbar is: .

Following plots support compensation display:

- ✓ Waveform
- ✓ Shaft XY Vibration
- ✓ Bode
- ✓ Polar

All Frequency

Use this command to display the plot that is generated by signal having all frequency components. Its short icon on toolbar is All.

The command applies to following plots:

- ✓ Waveform
- ✓ Spectrum
- ✓ Shaft XY Vibration

- ✓ Shaft centerline
- ✓ Trend
- ✓ Waterfall
- ✓ Cascade
- ✓ Waveform with DC Coupling
- ✓ Shaft XY Vibration with DC Coupling

1X

Use this command to display the plot that is generated by signal having 1X frequency component. Its short icon on toolbar is  .

This command applies to following plots:

- ✓ Waveform
- ✓ Shaft XY Vibration
- ✓ Trend
- ✓ Bode
- ✓ Polar

2X

Use this command to display the plot that is generated by signal having 2X frequency component. Its short icon on toolbar is  .

This command applies to following plots:

- ✓ Waveform
- ✓ Shaft XY Vibration
- ✓ Trend
- ✓ Bode
- ✓ Polar

NX

Use this command to display the plot that is generated by signal having NX frequency component.

This command applies to following plots:

- ✓ Waveform
- ✓ Shaft XY Vibration
- ✓ Trend
- ✓ Bode
- ✓ Polar

NOT1X

Use this command to display the plot that is generated by signal having all frequency components but with 1X frequency component filtered out.

This command applies to following plots:

- ✓ Waveform
- ✓ Shaft XY Vibration
- ✓ Trend

Gap

Use this command to display the related Gap trend plot when user views a dynamic or transient trend plot of a measurement point. Note that the measurement point must map DAQ card's Vibration [from Prox] channel.

Show Transient Collection List

Use this command to display a hidden "List of Transient (Data Collecting)" window. Its shortcut icon on toolbar is: TC.

Show Transient Storage List

Use this command to display a hidden "List of Transient (Data Storing)" window. Its shortcut icon on toolbar is: TS.

Define Shaft Centerline Zero

Use this command to define zero for the shaft centerline. Rest the mouse pointer on the shaft centerline plot window and select **Define Shaft Centerline Zero** from **View** menu, and then click the point that is located on the center of the shaft centerline curve. After that, the shaft centerline curve will be moved to the center of the window.

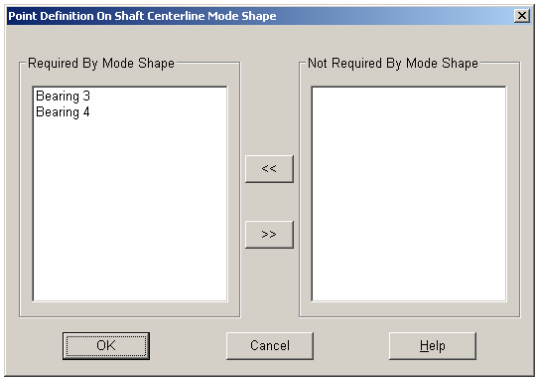
Shaft Mode Shape Setup

This command is used to define mode shape for shaft centerline and shaft XY vibration. To set the mode shape for shaft centerline and shaft XY vibration, make sure Display module on local Display Terminal is started.

Mode Shape Setup for Shaft Centerline

Select a machine train from tree view first, and then select **Shaft Centerline Mode Shape** from **Plots** menu (or right click the machine train and select **Shaft Centerline Mode Shape** from shortcut menu). By default, all available shaft centerline mode shape of measurement points beneath this machine train will be launched.

Then select **Shaft Mode Shape Setup** from **View** menu to open “Point Definition On Shaft Centerline Mode Shape” window. On this window, you can select the measurement points that require or don’t require shaft centerline mode shape on the current PCM Explorer. By default, all available measurement points will be shown in the “Required By Mode Shape” list.



NOTES:

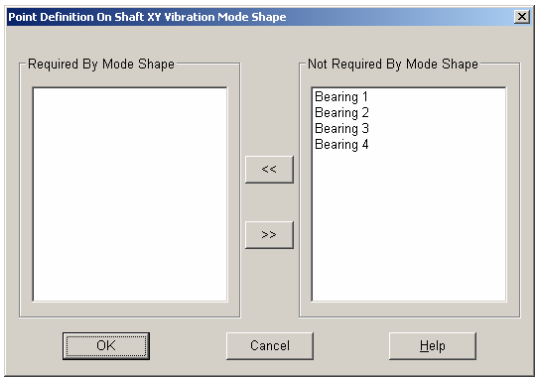
1. Shaft centerline mode shape only applies to the dual-channel measurement points that mapped the DAQ card’s Vibration [from Prox] channels. Moreover, the two measurement point channels should have the same measurement parameter settings.

2. The measurement points on “Shaft Centerline Mode Shape” window should be fixed on the same shaft. Or else the mode shape makes no sense for your reference.

Mode Shape Setup for Shaft XY Vibration

Select a machine train from tree view first, and then select **Shaft XY Vibration Mode Shape** from **Plots** menu (or right click the machine train and select **Shaft XY Vibration Mode Shape** from shortcut menu).

If you haven’t set the mode shape for shaft XY vibration or no measurement points beneath the selected machine train met the condition to show shaft XY vibration, by default “Point Definition On Shaft XY Vibration Mode Shape” window will be launched to let user select measurement points. Or else, Display software will directly show the “Shaft XY Vibration Mode Shape” window.



On “Point Definition On Shaft XY Vibration Mode Shape” window, you can select the measurement points that require or don’t require shaft XY vibration mode shape on the current PCM Explorer.

NOTES:

1. Shaft XY vibration mode shape only applies to the dual-channel measurement points that mapped the DAQ card’s Acceleration, Velocity, or Vibration [from Prox] channel. Moreover, the two measurement point channels should map DAQ card’s channel with the same type and other measurement parameter settings.
2. The shaft XY vibration mode shape for the measurement points that mapped different type of DAQ card’s channel can’t be displayed on the same mode shape window.
3. The measurement points on “Shaft XY Vibration Mode Shape” window should be fixed on the same shaft. Or else the mode shape makes no sense for your reference.

Previous

It is always used in two conditions:

- When you are viewing plot group of an item (such as a sample or a measurement point or a transient trigger record), you can use this command to switch to plot group of the previous item.
- When you are viewing the waveform and spectrum by double clicking the point on trend plot, you can use this command to switch to waveform and spectrum of the sample that related to the previous point. The point cursor on the trend curve will also move at the same time.

The short icon of this command on toolbar is  .

Next

It is always used in two conditions:

- When you are viewing plot group window of an item (such as a sample or a measurement point or a transient trigger record), you can use this command to switch to plot group window of the next item.
- When you are viewing the waveform and spectrum by double clicking the point on trend plot, you can use this command to switch to waveform and spectrum of the sample that related to the next point. The point cursor on the trend curve will also move at the same time.

The shortcut icon of this command on toolbar is  .

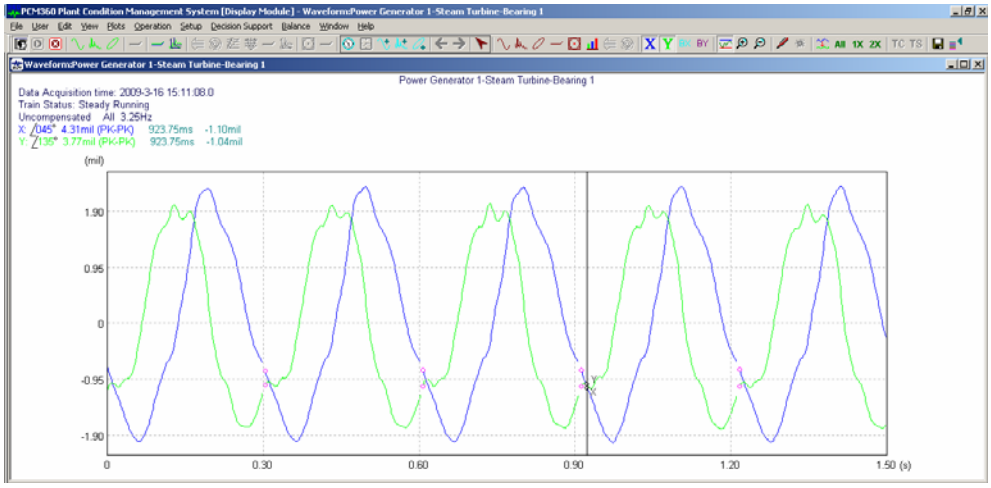
Plots Menu

Waveform

Waveform plot is a presentation of the instantaneous amplitude of a signal as a function of time. It applies to all dynamic samples and transient samples. Table below represents the relation between data, measurement point, device and channel type.

<table>
<tr><th rowspan="2">Data</th><th colspan="2">Measurement Point</th><th rowspan="2">Device</th><th rowspan="2">Channel Type</th></tr>
<tr><th>Single Channel</th><th>Dual Channel</th></tr>
<tr><td rowspan="2">Dynamic sample</td><td rowspan="2">✓</td><td rowspan="2">✓</td><td>DAQ Card: 6013,6220, 6250</td><td rowspan="3">Acceleration, Velocity, Vibration [from Prox]</td></tr>
<tr><td>DW device</td></tr>
<tr><td>Transient sample</td><td>✓</td><td>✓</td><td>DAQ Card: 6013,6220, 6250</td></tr>
</table>

Display waveform plot: Ensure the Display module on local Display Terminal is started. Select a dynamic sample or transient sample first, and then select **Waveform** command from **Plots** menu (or directly click on toolbar; or right click the sample and select **Waveform** from shortcut menu). Picture below shows a waveform plot with both channel X and channel Y.



Plot Features:

- On waveform curve, points that are marked by pink color are phase reference.
- **Auto full scale the waveform:** Click on toolbar.
- **Magnify or restore the waveform:** Use or on toolbar.
- **Compensate or un-compensate the waveform:** Click on toolbar.
- **View waveform of different frequency components:** Click All, 1X, 2X on toolbar, or select the related commands (All Frequency, 1X, 2X, NX, NOT1X) from **View** menu.
- **Display/hide waveform of channel X (channel Y):** For waveform generated by dynamic or transient sample under the dual-channel measurement point, by default the Display software will show waveform plots of both channel X and channel Y. To view single channel's waveform plot, click X or Y on toolbar.
- **Display/hide waveform of baseline sample:** If the baseline sample for this measurement point is specified, clicking BX and BY on toolbar will display baseline waveform plots of channel X and channel Y.
- **Add note for the sample:** Click **Add Note** command from **Operation** menu (or right click the plot and select **Add Note** from shortcut menu).
- **Show the note on plot:** To view or edit the sample's note on the plot, click **Show Note** command from **Operation** menu (or right click the plot and select **Show Note** from shortcut menu).
- **Select different point on waveform curve:** Press Left or Right key on keyboard.

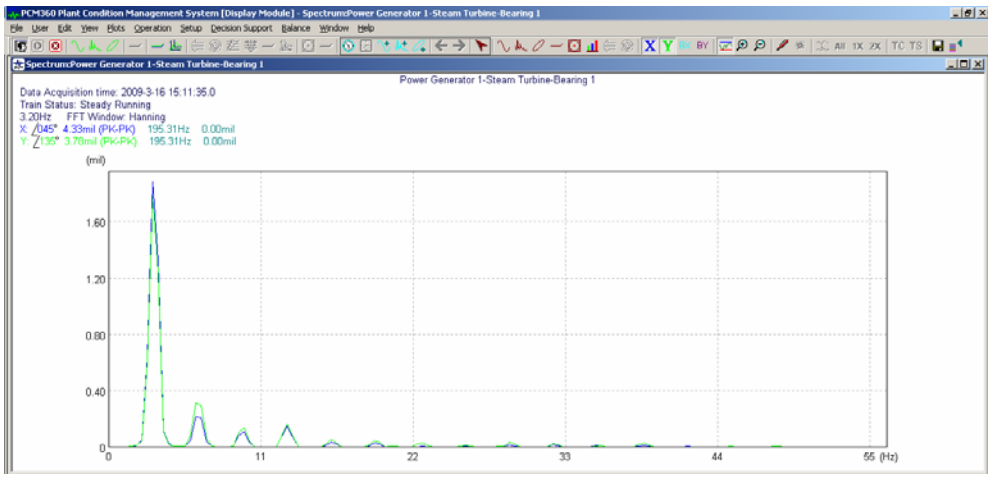
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Spectrum

Spectrum plot is commonly a presentation of the amplitudes of a signal's frequency components versus their frequencies. It applies to all dynamic samples and transient samples. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Dynamic sample	✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]
			DW device	
Transient sample	✓	✓	DAQ Card: 6013,6220, 6250	

Display spectrum plot: Ensure the Display module on local Display Terminal is started. Select an available sample first, and then select **Spectrum** command from **Plots** menu (or directly click on toolbar; or right click the sample and select **Spectrum** from shortcut menu). Picture below shows a spectrum plot with both channel X and channel Y.



Plot Features:

- **Auto full scale the spectrum:** Click on toolbar.
- **Magnify or restore the spectrum:** Use or on toolbar.
- **Display/hide spectrum of channel X (channel Y):** For spectrum generated by dynamic or transient sample under the dual-channel measurement point, by default the Display software will show spectrum

plots of both channel X and channel Y. To view single channel's spectrum plot, click X or Y on toolbar.

- **Display/hide waveform of baseline sample:** If the baseline sample for this measurement point is specified, clicking BX and BY on toolbar will view baseline spectrum plots of channel X and channel Y.
- **View harmonics/sideband/band alarm line/full spectrum plot:** Click the related command from **View** menu (or right click the spectrum plot and then select the related command from the shortcut menu). For more information concerning these commands, refer to ***PCM360 DISPLAY SOFTWARE OPERATION/View Menu/Harmonics***, ***View Menu/Sideband***, ***View Menu/Band Alarm Line***, ***View Menu/Full Spectrum***.
- **Add note for the sample:** Click **Add Note** command from **Operation** menu (or right click the plot and select **Add Note** from shortcut menu).
- **Show the note on plot:** To view or edit the sample's note on the plot, click **Show Note** command from **Operation** menu (or right click the plot and select **Show Note** from shortcut menu).
- **Select different point on waveform curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

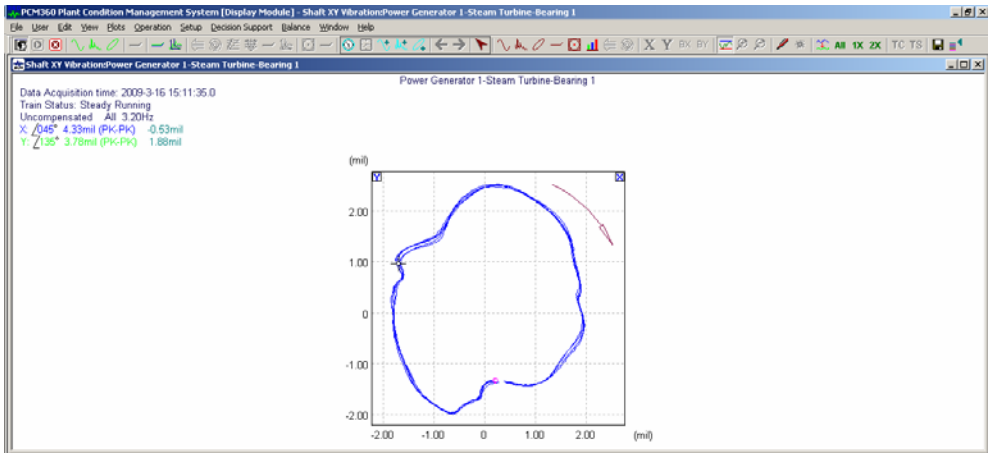
Shaft XY Vibration

Shaft XY vibration is two dimensional path of the shaft centerline motion perpendicular to the rotor axis during precession. The curve can be observed with an oscilloscope in orbital mode connected to XY vibration measuring transducers. Shaft XY vibration only applies to dynamic samples and transient samples under the dual-channel measurement point that must map the same type of DAQ channel.

Table below represents the relation between data, measurement point, device and channel type.

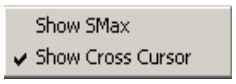
<table>
<tr><th rowspan="2">Data</th><th colspan="2">Measurement Point</th><th rowspan="2">Device</th><th rowspan="2">Channel Type</th></tr>
<tr><th>Single Channel</th><th>Dual Channel</th></tr>
<tr><td rowspan="2">Dynamic sample</td><td rowspan="2"></td><td rowspan="2">✓</td><td>DAQ Card: 6013,6220, 6250</td><td rowspan="3">Acceleration, Velocity, Vibration [from Prox]</td></tr>
<tr><td>DW device</td></tr>
<tr><td>Transient sample</td><td></td><td>✓</td><td>DAQ Card: 6013,6220, 6250</td></tr>
</table>

Display shaft XY vibration plot: Ensure the Display module on local computer is started. Select an available sample first, and then select **Shaft XY Vibration** from **Plots** menu (or directly click on toolbar; or right click the sample and select **Shaft XY Vibration** from shortcut menu). Picture below shows a shaft XY vibration plot.



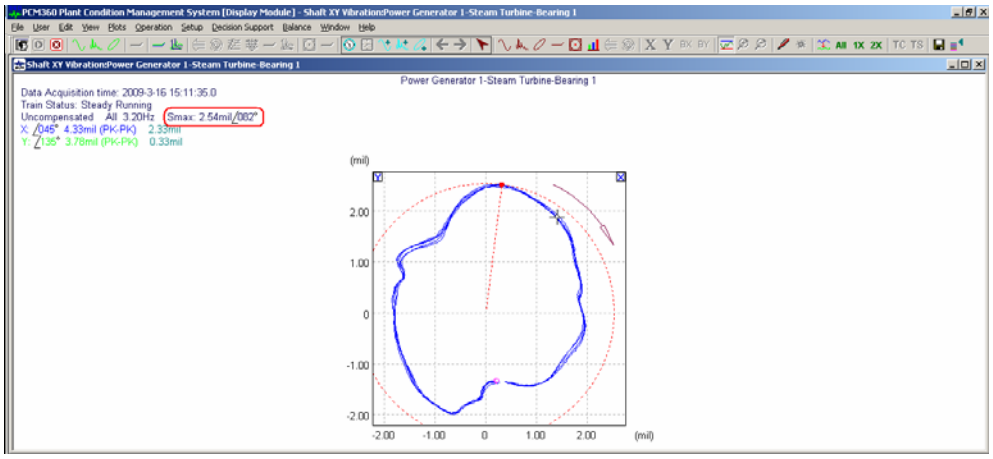
Plot Features:

- On the curve, points that are marked by pink color are phase reference.
- **Auto full scale the shaft XY vibration:** Click on toolbar.
- **Compensate or un-compensate the shaft XY vibration:** Click on toolbar.
- **View shaft XY vibration plot of different frequency components:** Click All, 1X, 2X on toolbar, or select the related commands (All Frequency, 1X, 2X, NX, NOT1X) from **View** menu.
- **Show SMax and Cross Cursor:** Right click anywhere on the shaft XY vibration and select the related command from shortcut menu.



By default, “Show Cross Cursor” is marked. Once this command is marked, the selected point on the curve will be marked by the cross cursor just like “+”.

Show SMax: SMax is maximum RMS value of the points on the shaft XY vibration. Select this command to display the SMax point on the plot. And the SMax information that contains amplitude and vector angle of the SMax point will also be shown above the plot.



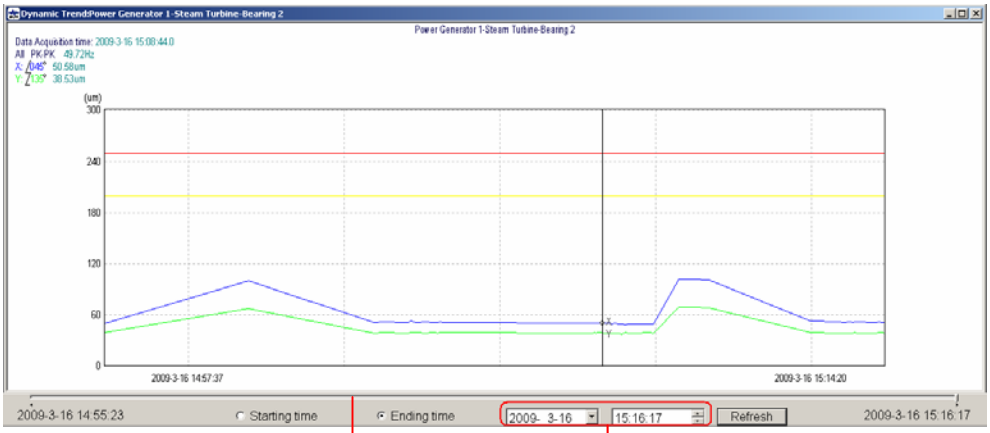
- **Add note for the sample:** Click **Add Note** command from **Operation** menu (or right click the plot and select **Add Note** from shortcut menu).
- **Show the note on plot:** To view or edit the sample's note on the plot, click **Show Note** command from **Operation** menu (or right click the plot and select **Show Note** from shortcut menu).
- **Select different point on shaft XY vibration:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Trend (Dyn)

Dynamic trend plot is a presentation in Cartesian coordinates of a measured variable versus time, based on all dynamic samples under a measurement point taken over different times. Table below represents the relation between data, measurement point, device and channel type.

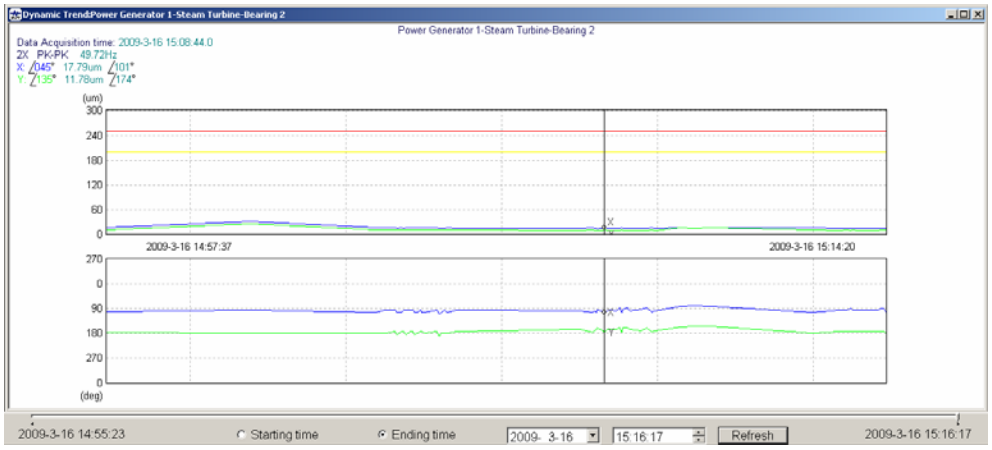
Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Dynamic samples	✓	✓	DAQ Card: 6013,6220, 6250 DW device	Acceleration, Velocity, Vibration [from Prox]

Display dynamic trend plot: Ensure the Display module on local Display Terminal is started. From tree view, select Dynamic symbol beneath the measurement point, and then select **Trend (Dyn)** from **Plots** menu (or directly click on toolbar; or right-click Dynamic symbol and select **Trend (Dyn)** from shortcut menu). Picture below shows a dynamic trend plot.



Plot Features:

- **Auto full scale the dynamic trend:** Click on toolbar.
- **Magnify or restore the dynamic trend:** Use or on toolbar.
- **View dynamic trend plot of different frequency components:** Click All, 1X, 2X on toolbar, or select the related commands (All Frequency, 1X, 2X, NX, NOT1X) from **View** menu. When user views dynamic trend plot of 1X/2X/NX frequency component, Display software will also show the phase angle trend plot.



- **View Gap trend plot:** Click **Gap** command from **View** menu (or right click the plot and select **Gap** from the shortcut menu). The function only applies to trend generated by samples from DAQ card's Vibration [from Prox] measured channel.
- **Display/hide dynamic trend of channel X (channel Y):** For dynamic trend plot generated by dynamic samples under the dual-channel measurement point, by default the Display software will show dynamic trend plots of both channel X and channel Y. To view single channel's dynamic trend plot, click X and Y on toolbar.

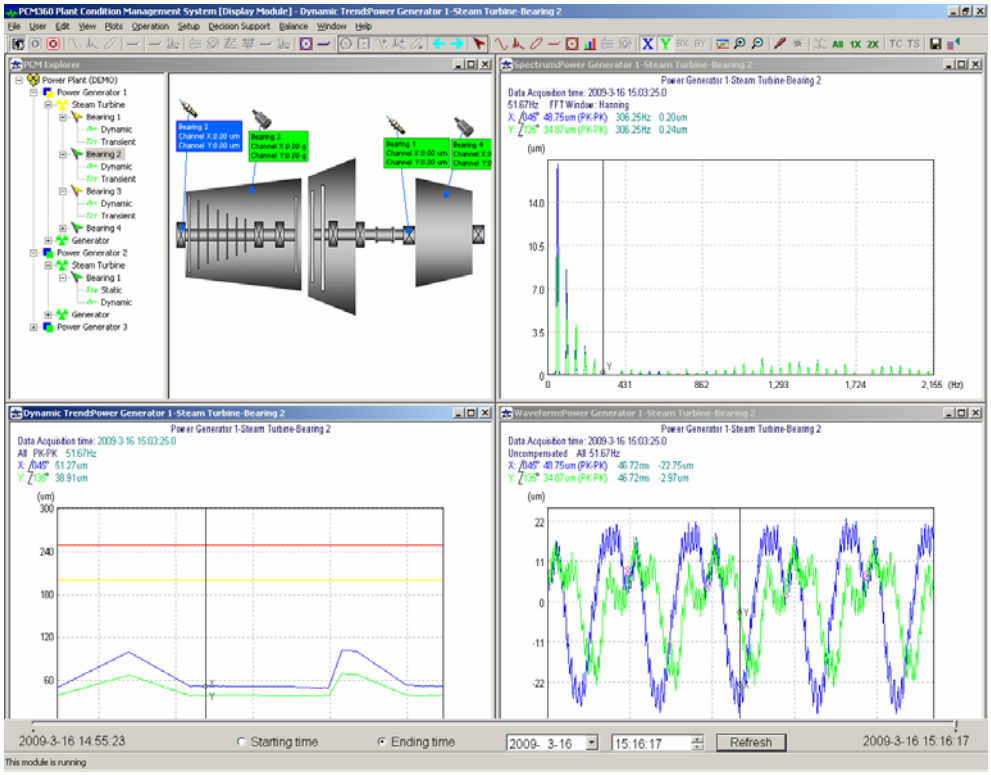
- **View trend plot within selected time range:** User can view the trend plot in a time period. There are three methods to specify the time range.

  Method 1: Right click a point on the trend, and then select **Set Starting Time** from shortcut menu. The time that relates to this point is specified as the starting time. Set the ending time in the same way and finally click **Refresh** button.

  Method 2: Mark "Starting time", and directly select the time on the time slider. Then set the ending time in the same way and finally click **Refresh** button.

  Method 3: Mark "Starting time", and orderly select date and time from date and time picker. Then set the ending time in the same way and finally click **Refresh** button.

- **View waveform and spectrum of the sample:** Double click a point on the dynamic trend and then the waveform and spectrum plot of the sample associated with this point are displayed. By clicking or on toolbar, user can view the waveform and spectrum generated by the previous or the next dynamic sample, and the point cursor on the trend plot will move at the same time.



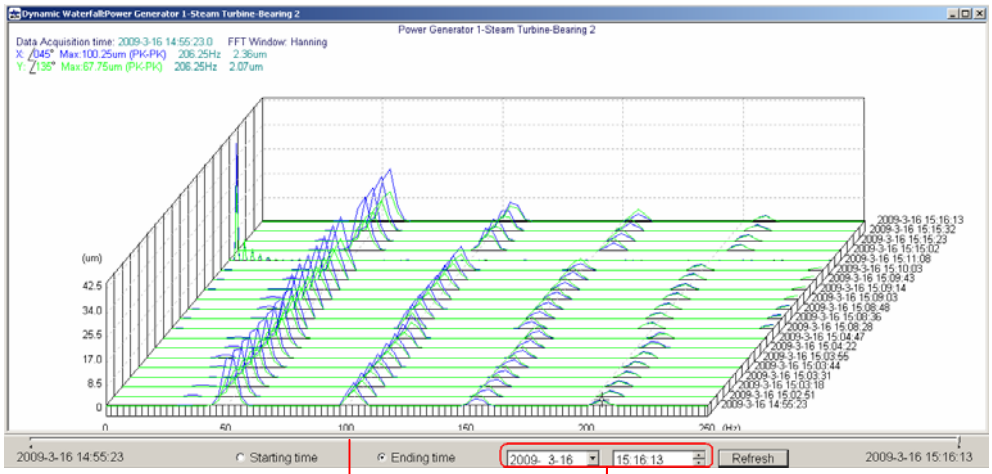
- **Select different point on the dynamic trend curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Waterfall (Dyn)

Dynamic waterfall plot displays a stack of spectrum plots, based on all dynamic samples under a measurement point taken over some period time. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Dynamic samples	✓	✓	DAQ Card: 6013,6220, 6250 DW device	Acceleration, Velocity, Vibration [from Prox]

Display dynamic waterfall plot: Ensure the Display module on local Display Terminal is started. From tree view, select Dynamic symbol beneath a measurement point, and then select **Waterfall (Dyn)** from **Plots** menu (or directly click on toolbar; or right-click Dynamic symbol and select **Waterfall (Dyn)** from shortcut menu). Picture below shows a dynamic waterfall plot.



Plot Features:

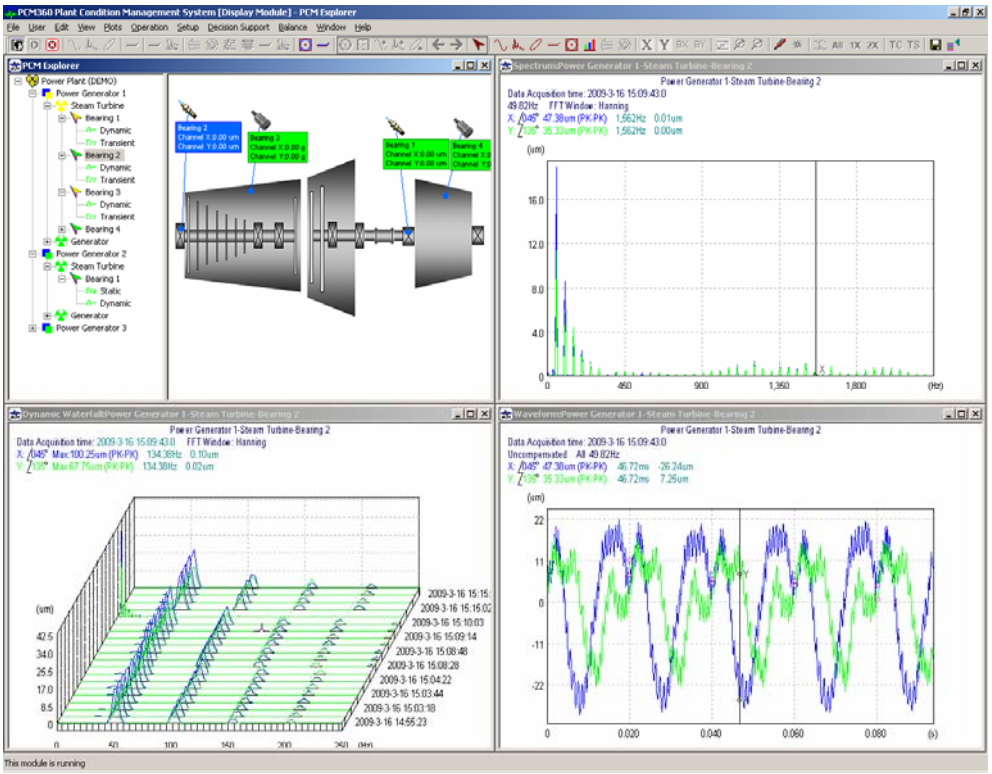
- **Auto full scale the dynamic waterfall:** Click on toolbar.
- **Display/hide dynamic waterfall of channel X (channel Y):** For dynamic waterfall generated by dynamic samples under the dual channel measurement points, by default the Display software will show dynamic waterfall plots of both channel X and channel Y. To view single channel's dynamic waterfall plot window, click X and Y on toolbar.
- **View waterfall plot within selected time range:** Similar to dynamic trend plot, user can view the dynamic waterfall plot in a time period. Two methods to specify the time range:

Method 1: Mark “Starting time”, and directly select the time on the time slider. Then set the ending time in the same way and finally click **Refresh** button.

Method 2: Mark “Starting time”, and orderly select date and time from date and time picker. Then set the ending time in the same way and finally click **Refresh** button.

By default, the number of the spectrum curve on the dynamic waterfall depends on the waterfall depth. When you change the display time range of the waterfall plot, the spectrum number may change. For example, you set the waterfall depth to 20 and currently only 15 dynamic samples were collected within the display time range, under this condition, Display software will display the waterfall generated by 15 spectrum curves.

- **View waveform and spectrum of the sample:** Double click a spectrum curve on the dynamic waterfall, and then the waveform plot and spectrum plot of the sample associated with the spectrum curve are displayed.



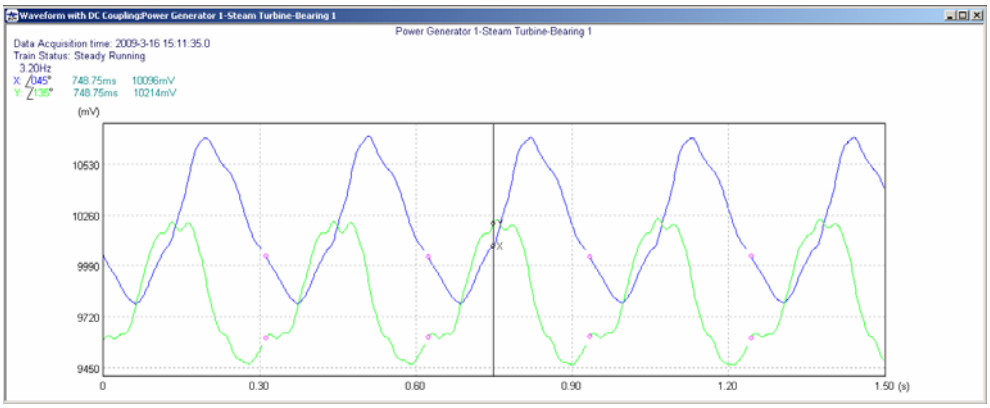
- **Select different point on the same spectrum curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Waveform with DC Coupling

Waveform plot with DC Coupling is a presentation of the instantaneous DC voltage of a signal as a function of time, based on data from DAQ card's Vibration [from Prox] channel. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Dynamic sample	✓	✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]
Transient sample				

Display waveform with DC Coupling: Ensure the Display module on local Display Terminal is started. Select the available sample, and then select **Waveform with DC Coupling** from **Plots** menu (or right click the sample and select **Waveform with DC Coupling** from shortcut menu). Picture below shows a waveform with DC Coupling plot with both channel X and channel Y.



Plot Features:

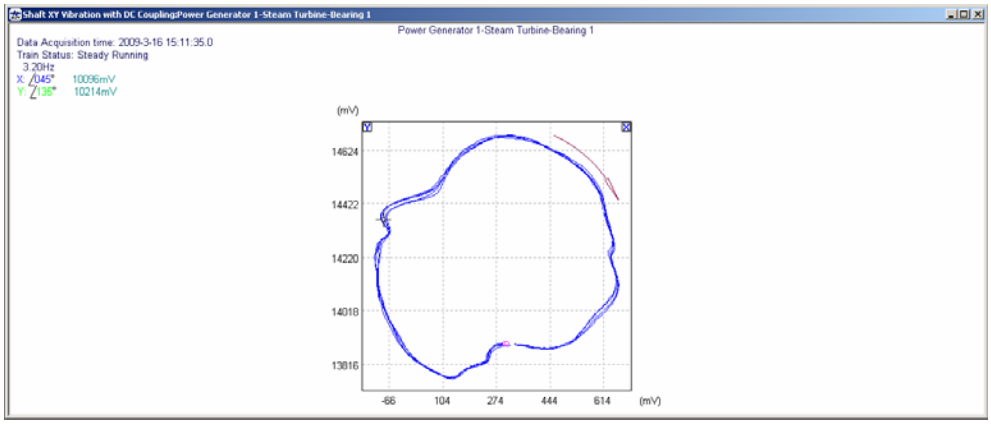
- On the curve, points that are marked by pink color are phase reference.
- **Auto full scale the plot:** Click on toolbar.
- **Magnify or restore the plot:** Use and on toolbar.
- **Display/hide the plot of channel X (channel Y):** For plot generated by sample under the dual-channel measurement point, by default the Display software will show plots of both channel X and channel Y. To view single channel's plot window, click X and Y on toolbar.
- **Select different point on the curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Shaft XY Vibration with DC Coupling

Shaft XY vibration with DC Coupling is a presentation of DC voltage in two dimensional path of the shaft centerline motion perpendicular to the rotor axis during precession, based on data from DAQ card's Vibration [from Prox] channel. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Dynamic sample		✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]
Transient sample				

Display shaft XY vibration with DC Coupling: Ensure the Display module on local Display Terminal is started. Select the available sample, and then select **Shaft XY Vibration with DC Coupling** from **Plots** menu (or right click this sample and select **Shaft XY Vibration with DC Coupling** from shortcut menu). Picture below shows a shaft XY vibration with DC Coupling plot.



Plot Features:

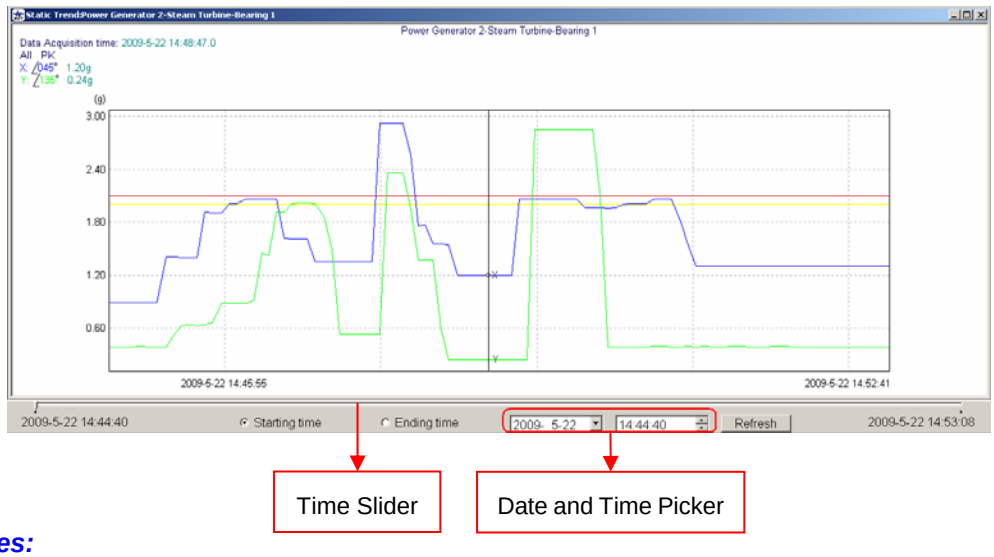
- On the curve, points that are marked by pink color are phase reference.
- **Auto full scale the plot:** Click on toolbar.
- **Select different point on the curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Trend (Sta)

Static trend plot is a presentation in Cartesian coordinates of a measured variable versus time, based on static samples taken over different times. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Static samples	✓	✓	DAQ Card: 6013,6220, 6250	Position [from Prox], Process
			Modbus DAQ for Process	All types
			DW device	Acceleration, Velocity, Vibration [from Prox]
			OPC Client	All types

Display static trend plot: Ensure the Display module on local Display Terminal is started. From tree view, select Static symbol beneath the measurement point, and then select **Trend (Sta)** from **Plots** menu (or directly click on toolbar; or right click Static symbol and select **Trend (Sta)** from shortcut menu). Picture below shows a static trend plot.



Plot Features:

- **Auto full scale the static trend:** Click on toolbar.
- **Magnify or restore the static trend:** Use or on toolbar.
- **Display/hide static trend of channel X (channel Y):** For plot generated by static samples under the dual channel measurement point, by default the Display software will show static trend plots of both

channel X and channel Y. To view single channel's static trend plot window, click X and Y on toolbar.

- **View trend plot within selected time range:** User can view the trend plot in a time period. There are three methods to specify the time range.

  Method 1: Right click a point on the trend, and then select **Set Starting Time** from shortcut menu. The time that relates to this point is specified as the starting time. Set the ending time in the same way and finally click **Refresh** button.

  Method 2: Mark "Starting time", and directly select the time on the time slider. Then set the ending time in the same way and finally click **Refresh** button.

  Method 3: Mark "Starting time", and orderly select date and time from date and time picker. Then set the ending time in the same way and finally click **Refresh** button.

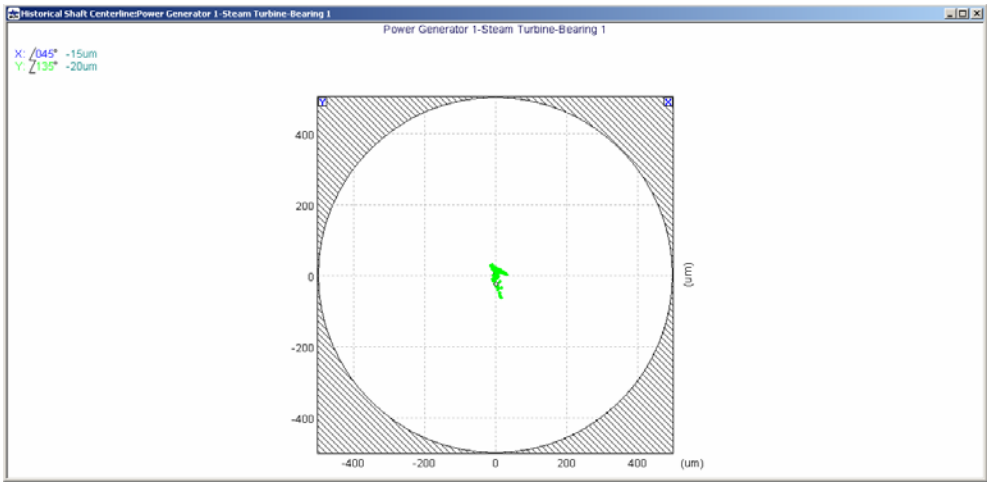
- **Select different point on the plot:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Shaft Centerline (H)

Shaft centerline displays average (DC) value of rotor shaft position, based on data from DAQ card's Vibration [from Prox] channel. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Historical samples (contains both dynamic and transient samples)		✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]

Display the historical shaft centerline plot: Ensure the Display module on local Display Terminal is started. From tree view, select the available measurement point and then select **Shaft Centerline (H)** from **Plots** menu (or directly click on toolbar; or right click this measurement point and then select **Shaft Centerline (H)** from shortcut menu). Picture below shows a historical shaft centerline plot.



Plot Features:

- **Auto full scale the plot:** Click command on toolbar. Once the curve was auto full scaled, you can't define zero for it.
- **Select different point on the plot:** Press Left or Right key on keyboard.
- **Define Zero for the plot:** If shaft centerline curve isn't at the center of the plot, you can move the curve to the center by using **Define Shaft Centerline Zero** command: Select **Define Shaft Centerline Zero** from **View** menu first and then click the center of the shaft centerline curve.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Trend (H)

Historical trend plot is a presentation in Cartesian coordinates of a measured variable versus time, based on data from DAQ card's Acceleration, Velocity, or Vibration [from Prox] channel. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Historical samples (contains both dynamic and transient samples)	✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]

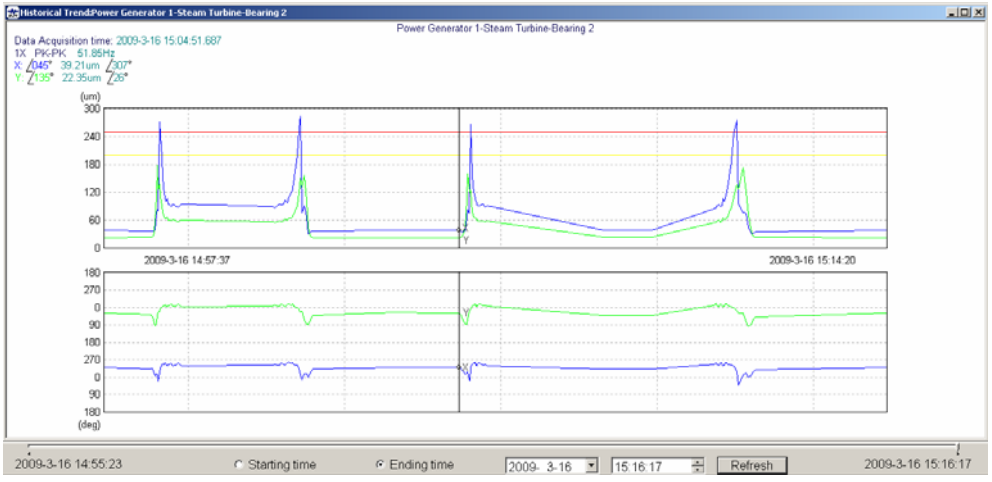
Display historical trend plot: Ensure the Display module on local Display Terminal is started. From tree view, select the available measurement point and then select **Trend (H)** from **Plots** menu (or directly click on

toolbar; or right click the measurement point and then click **Trend (H)** from the shortcut menu). Picture below shows a historical trend plot.



Plot Features:

- **Auto full scale the historical trend:** Click on toolbar.
- **Magnify or restore the historical trend:** Use or on toolbar.
- **View historical trend plot of different frequency components:** Click All, 1X, 2X on toolbar, or select the related commands (All Frequency, 1X, 2X, NX, NOT1X) from **View** menu. When user views historical trend plot of 1X/2X/NX frequency component, Display software will also show the phase angle trend plot.



- **View Gap trend plot:** Click **Gap** command from **View** menu (or right click the plot and select **Gap** from the shortcut menu). The function only applies to trend generated by samples from DAQ card's Vibration [from Prox] measured channel.
- **Display/hide dynamic trend of channel X (channel Y):** For historical trend plot generated by samples

under the dual-channel measurement point, by default the Display software will show trend plots of both channel X and channel Y. To view single channel's historical trend plot, click X and Y on toolbar.

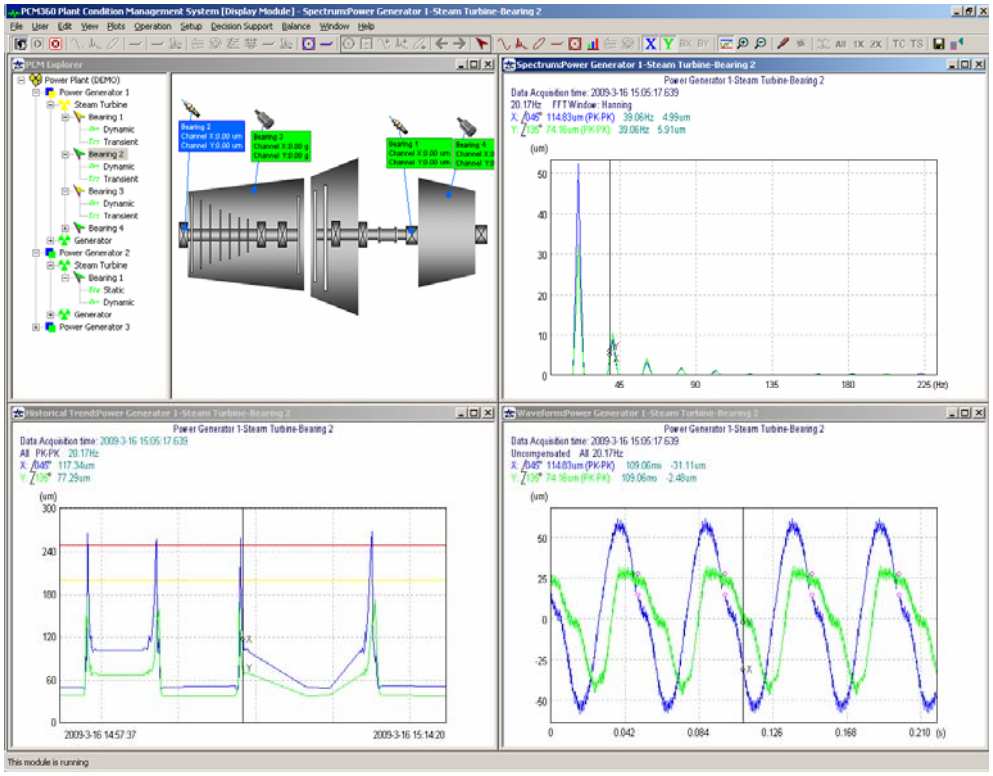
- **View trend plot within selected time range:** User can view the trend plot in a time period. There are three methods to specify the time range.

  Method 1: Right click a point on the trend, and then select **Set Starting Time** from shortcut menu. The time that relates to this point is specified as the starting time. Set the ending time in the same way and finally click **Refresh** button.

  Method 2: Mark "Starting time", and directly select the time on the time slider. Then set the ending time in the same way and finally click **Refresh** button.

  Method 3: Mark "Starting time", and orderly select date and time from date and time picker. Then set the ending time in the same way and finally click **Refresh** button.

- **View waveform and spectrum of the sample:** Double click a point on the historical trend, and then the waveform plot and spectrum plot of the sample associated with this point are displayed.



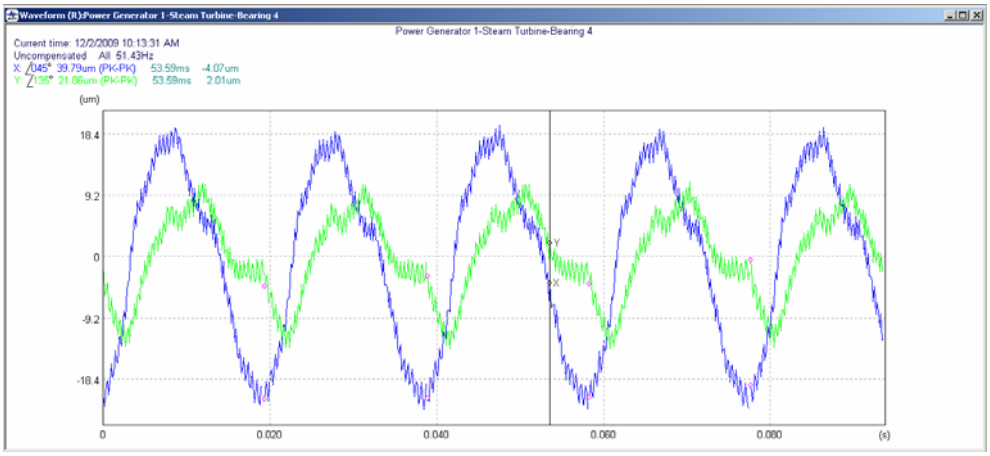
- **Select different point on the historical trend:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Waveform (R)

Table below represents the measurement point that can generate the real-time waveform plot.

Measurement Point		Device	Channel Type
Single Channel	Dual Channel		
✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]
		DW device	

Display real-time waveform: Ensure both the Display and DAQ modules are started. From tree view, select an available measurement point and then select **Waveform (R)** from **Plots** menu (or directly click  on toolbar; or right click this measurement point and then select **Waveform (R)** from shortcut menu). Picture below shows a real-time waveform plot.



The functions for historical waveform also apply to real-time waveform plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Waveform*** to get more details.

Spectrum (R)

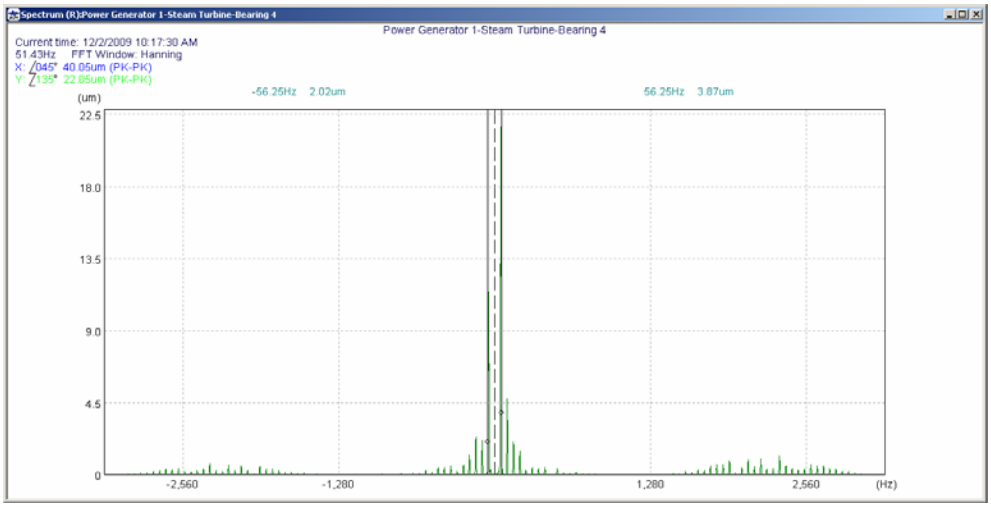
Table below represents the measurement point that can generate the real-time spectrum plot.

Measurement Point		Device	Channel Type
Single Channel	Dual Channel		
✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]
		DW device	

Display real-time spectrum: Ensure both the Display and DAQ modules are started. From tree view, select an available measurement point and then select **Spectrum (R)** from **Plots** menu (or directly click  on toolbar; or right click this measurement point and then select **Spectrum (R)** from shortcut menu). Picture below shows a real-time spectrum plot.



When you are viewing a spectrum, right click the plot and select **Full Spectrum** from shortcut menu (or select **Full Spectrum** command from **View** menu), and real-time full spectrum is displayed. See picture below:



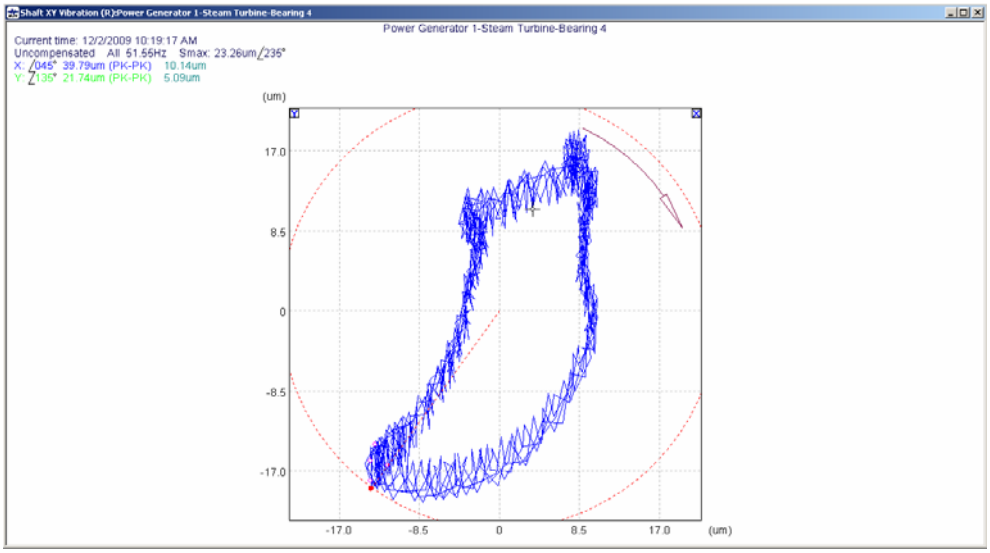
Some functions for historical spectrum plot also apply to real-time spectrum plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Spectrum*** to get more details.

Shaft XY Vibration (R)

Table below represents the measurement point that can generate the real-time shaft XY vibration plot. **Note** that the two channels of the measurement point must map the same type of DAQ channel.

Measurement Point		Device	Channel Type
Single Channel	Dual Channel		
	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]
		DW device	

Display real-time shaft XY vibration: Ensure both the Display and DAQ modules are started. From tree view, select an available measurement point and then select **Shaft XY Vibration (R)** from **Plots** menu (or directly click on toolbar; or right click this measurement point and then select **Shaft XY Vibration (R)** from shortcut menu). Picture below shows a real-time shaft XY vibration plot.

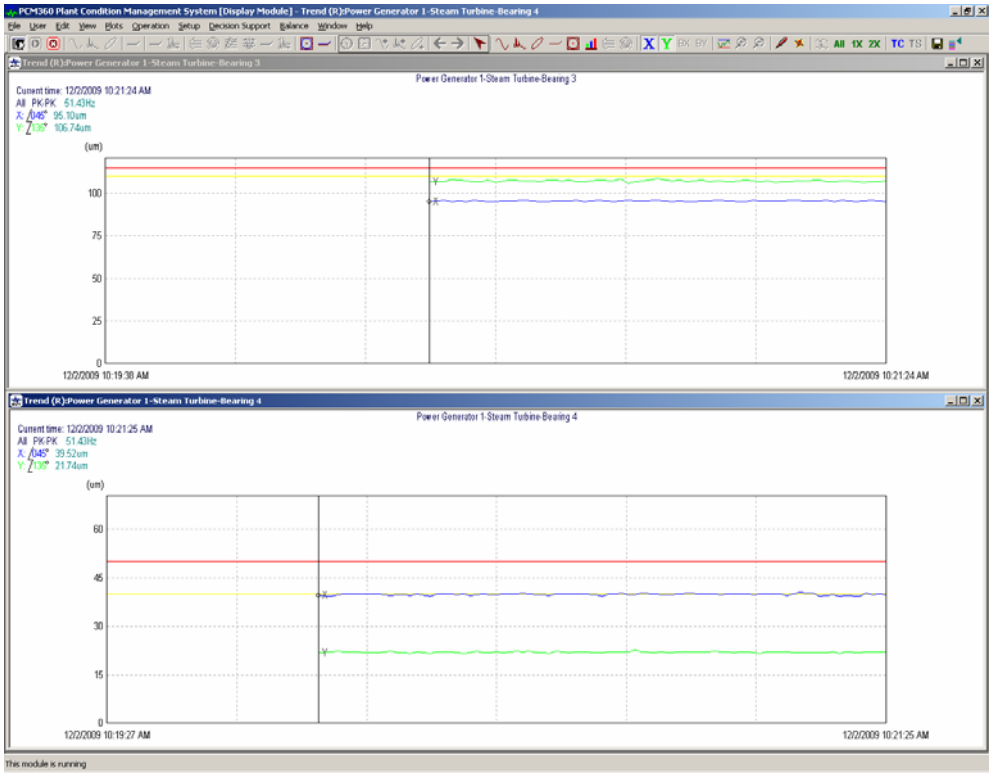


The functions for historical shaft XY vibration plot also apply to real-time shaft XY vibration plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Shaft XY Vibration*** to get more details.

Trend (R)

Real-time trend plot applies to all measurement points.

Display real-time trend: Ensure both the Display and DAQ modules are started. From tree view, select the measurement point and then select **Trend (R)** from **Plots** menu (or directly click on toolbar; or right click this measurement point and then select **Trend (R)** from shortcut menu). Picture below shows two real-time trend plots.



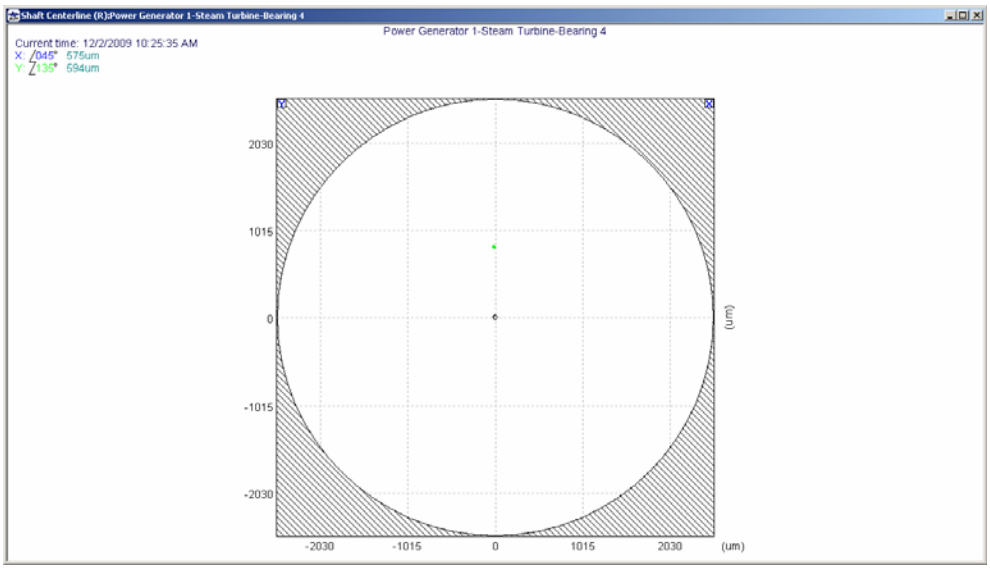
Functions for real-time trend plots of different measurement points may be different. That depends on the DAQ channels the measurement point mapped. So for real-time trend plot of measurement points that mapped DAQ card's Acceleration, Velocity or Vibration [from Prox] channels, you can consult ***PCM360 DISPLAY SOFTWARE OPERATION Plots Menu/Trend (H)***; and for real-time trend plot of measurement points that mapped other DAQ channels, you can consult ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Trend (Sta)***.

Shaft Centerline (R)

Table below represents the measurement point that can generate the real-time shaft centerline plot.

Measurement Point		Device	Channel Type
Single Channel	Dual Channel		
	✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]

Display real-time shaft centerline: Ensure DAQ and Display modules are started. From tree view, select the measurement point and then select **Shaft Centerline (R)** from **Plots** menu (or directly click on toolbar; or right click the measurement point and then select **Shaft Centerline (R)** from shortcut menu). Picture below shows a real-time shaft centerline plot.



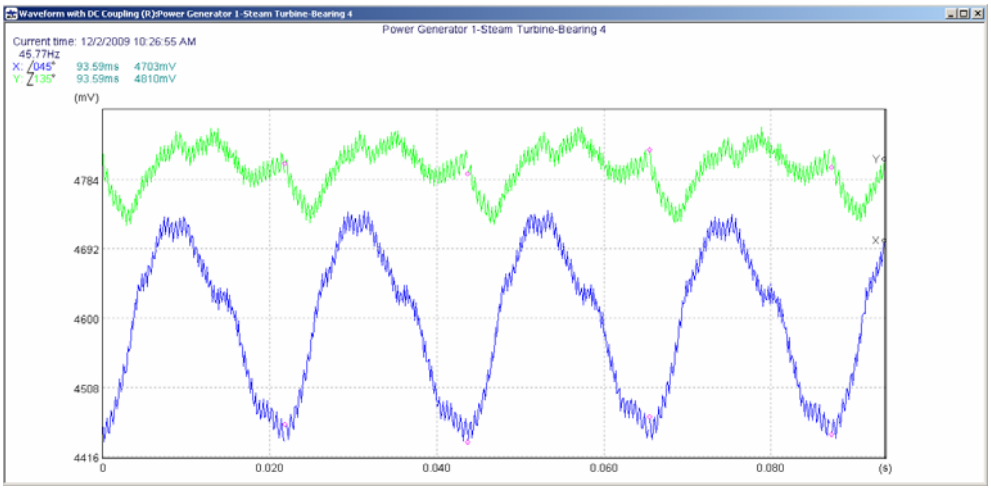
The functions for historical shaft centerline plot also apply to real-time shaft centerline plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Shaft Centerline (H)***.

Waveform with DC Coupling (R)

Table below represents the measurement point that can generate the real-time waveform with DC Coupling plot.

Measurement Point		Device	Channel Type
Single Channel	**Dual Channel**		
✓	✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]

Display real-time waveform with DC Coupling: Ensure both DAQ and Display modules are started. From tree view, select the measurement point and then select **Waveform with DC Coupling (R)** from **Plots** menu (or right click the measurement point and then select **Waveform with DC Coupling (R)** from shortcut menu). Picture below shows a real-time waveform with DC Coupling plot.



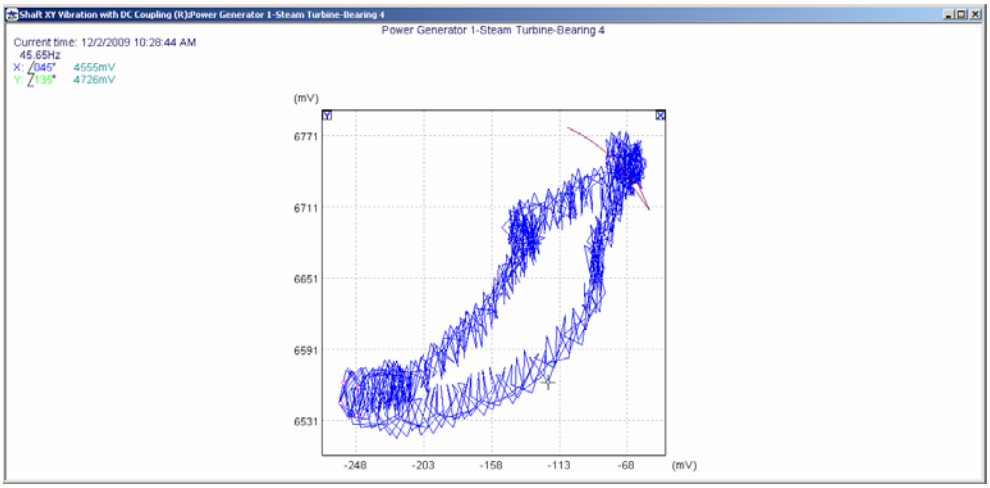
The functions for historical waveform with DC Coupling plot also apply to real-time waveform with DC Coupling plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Waveform with DC Coupling***.

Shaft XY Vibration with DC Coupling (R)

Table below represents the measurement point that can generate the real-time shaft XY vibration with DC Coupling plot.

Measurement Point		Device	Device Channel Type
Single Channel	**Dual Channel**		
	✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]

Display real-time shaft XY vibration with DC Coupling: Ensure both DAQ and Display modules are started. From tree view, select the measurement point and then select **Shaft XY Vibration with DC Coupling (R)** from **Plots** menu (or right click the measurement point and then select **Shaft XY Vibration with DC Coupling (R)** from shortcut menu). Picture below shows a real-time shaft XY vibration with DC Coupling plot.



The functions for historical shaft XY vibration with DC Coupling plot also apply to real-time shaft XY vibration with DC Coupling plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Shaft XY Vibration with DC Coupling***.

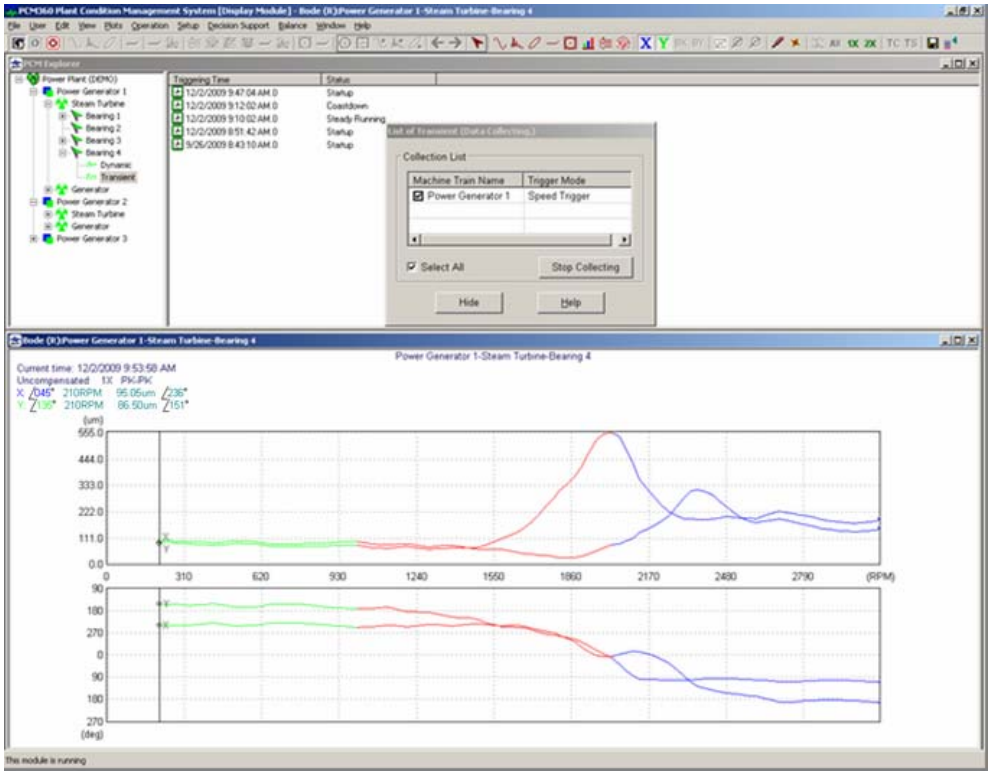
Bode (R)

Table below represents the measurement point that can generate the real-time bode plot.

Measurement Point		Device	Device Channel Type
Single Channel	Dual Channel		
✓	✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]

Note that the machine train must be speed-triggered and collecting transient data.

Display real-time bode: Ensure both DAQ and Display modules are started. From tree view, select the measurement point and then select **Bode (R)** from **Plots** menu (or directly click on toolbar; or right click the measurement point and then select **Bode (R)** from shortcut menu). Picture below shows a real-time bode plot.



Some functions for historical bode plot also apply to real-time bode plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Bode***.

NOTE: Display software supports showing real-time bode plots of up to two measurement points (four channels) at the same time.

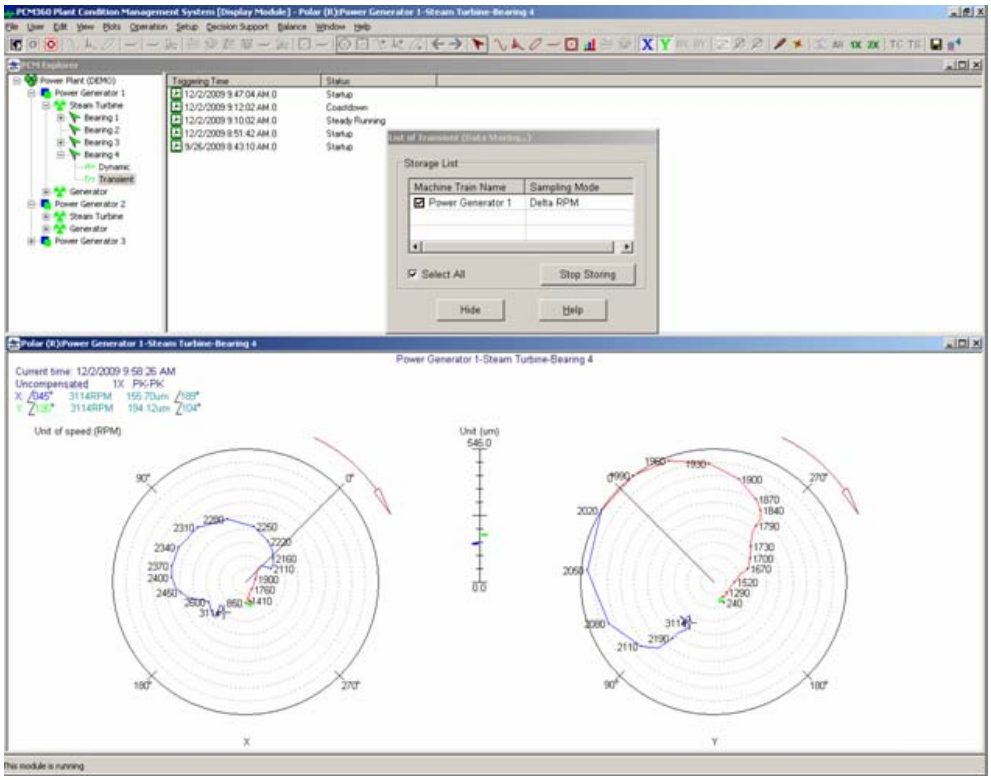
Polar (R)

Table below represents the measurement point that can generate the real-time polar plot.

Measurement Point		Device	Device Channel Type
Single Channel	**Dual Channel**		
✓	✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]

Note that the machine train must be speed-triggered and collecting transient data.

Display real-time polar: Ensure both DAQ and Display modules are started. From tree view, select the measurement point and then select **Polar (R)** from **Plots** menu (or directly click on toolbar; or right click the measurement point and then select **Polar (R)** from shortcut menu). Picture below shows a real-time polar plot.



Some functions for historical polar plot also apply to real-time polar plot. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Polar***.

NOTE: Display software supports showing real-time polar plots of up to two measurement points (four channels) at the same time.

Bar Graph

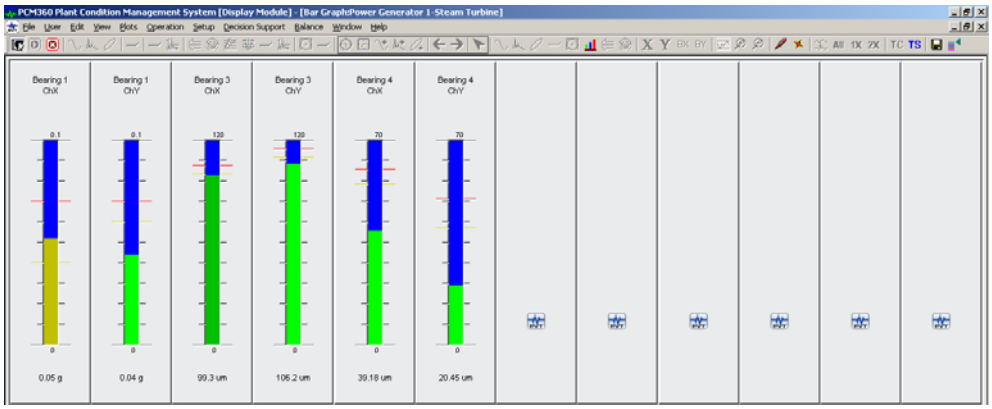
Bar graphs are a popular format for displaying current measured value and statuses of channels. The color of the bar graph indicates the channel's real-time alarm severity (the background color is blue).

- ✓ **Red:** Danger
- ✓ **Yellow:** Alert
- ✓ **Green:** Normal

Color status indication:

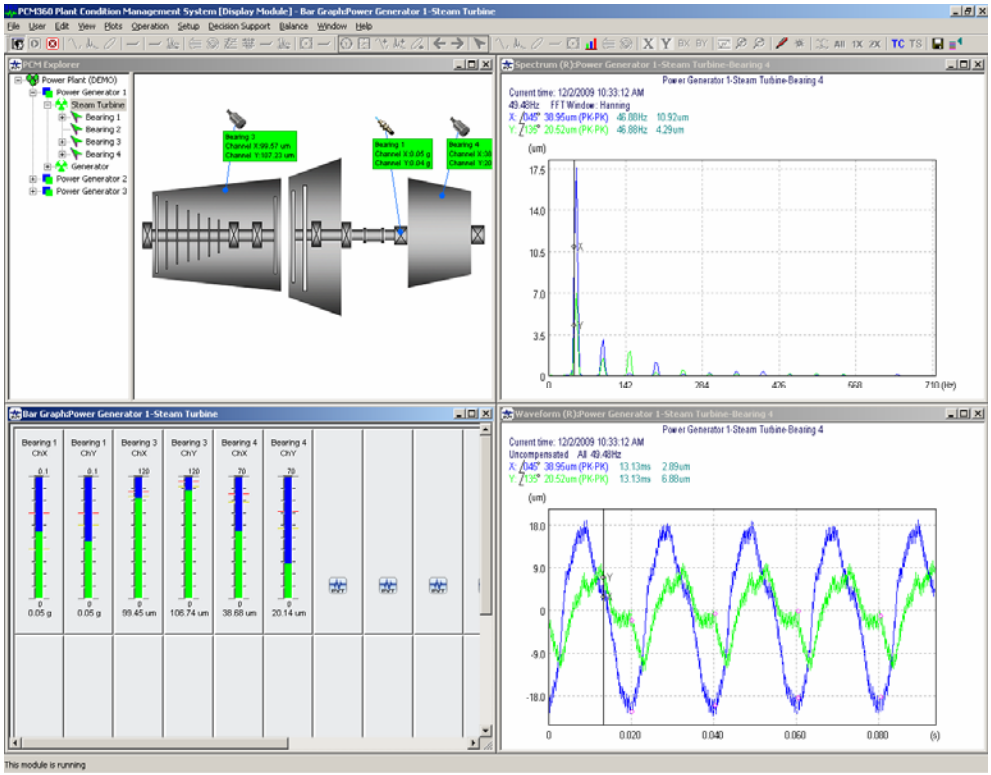
- ✓ **Flashing:** The channel has ever alarmed and the alarm was not acknowledged yet.
- ✓ **Solid:** On the channel, no alarm occurs or the alarm has been acknowledged.

Display bar graph: Ensure both DAQ and Display modules are started. Select a node from tree view (the node could be a machine train, a machine, or a measurement point). Then directly click  on toolbar (or right click this node and then select **Bar Graph** from shortcut menu; or select **Bar Graph** from **Plots** menu). Picture below shows a bar graph of a machine train.

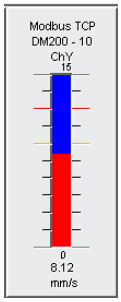


Plot Feature:

- **View real-time waveform and spectrum of channel:** For channel that mapped Acceleration, Velocity or Vibration [from Prox] channel of DAQ cards and DW devices, double clicking the bar graph of the channel will display the real-time waveform and real-time spectrum plot.



CAUTION: Sometimes even though the channel's real-time measured value doesn't exceed the alarm set point, the channel is still in alarm severity. See picture below:



That indicates the device channel was set with "Alarm Latching" property, once the channel alarmed, it will keep the alarm status unless the device is reset.

Bode

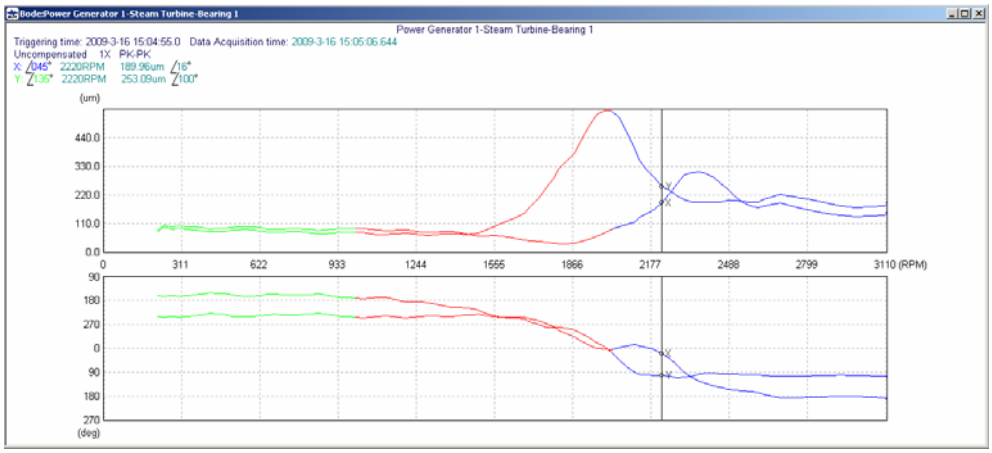
Bode plot presents a pair of graphs in Cartesian format displaying the NX vibration vector (amplitude and phase angle) as a function of shaft rotative speed. The Y axis of the top graph represents NX amplitude, while the Y axis of the bottom graph represents NX phase angle. The common X axis represents rotative speed.

Bode plot is generated by signals during machine startup or coastdown (transient status). Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Transient samples	✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]

NOTE: The measurement point channel must map phase reference.

Display bode plot: Ensure Display module is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on **Transient Trigger Record List view**, and finally click  on toolbar (or select **Bode** command from **Plots** menu; or right click the trigger record and select **Bode** from shortcut menu). Picture below shows a bode plot of 1X frequency with both channel X and channel Y.



Plot Features:

- **Compensate or un-compensate the plot:** Click on toolbar.
- **View bode of different frequency components:** Click 1X, 2X on toolbar, or select the related commands (1X, 2X, NX) from **View** menu.
- **Display/hide bode of channel X (channel Y):** For bode plot generated by transient data under the dual-channel measurement point, by default, Display software will show bode curves of both channel X and channel Y. To view bode plot of a single channel, click X or Y on toolbar.
- **Define Slow-Roll:** Right click a point on the curve and then select **Define Slow-Roll** from shortcut menu, after that, the transient sample that related to the point is defined as slow-roll sample.
- **Select different point on the curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Polar

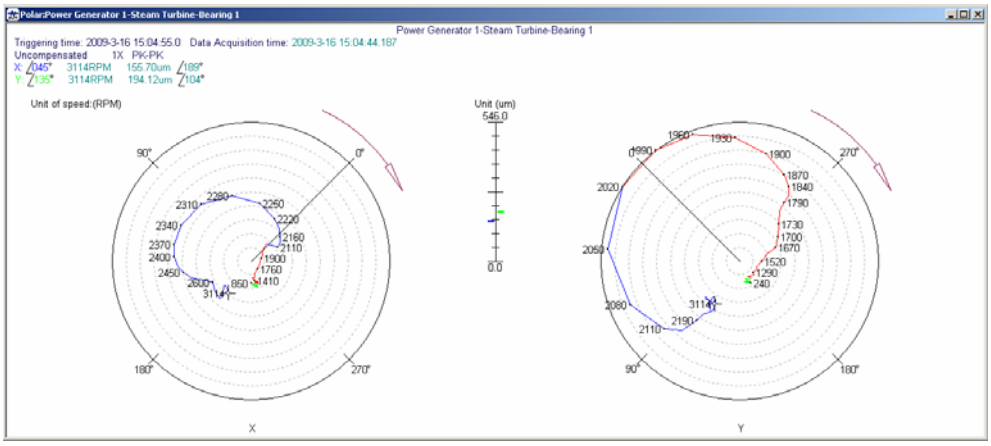
Polar plot is a polar format presentation of the locus of the NX shaft vibration vector from a single channel as a function of shaft rotative speed where N is user definable.

Polar plot is generated by signals during machine startup or coastdown (transient status). Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Transient samples	✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]

NOTE: The measurement point channel must map phase reference.

Display polar plot: Ensure Display module is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on **Transient Trigger Record List view**, and finally click on toolbar (or select **Polar** command from **Plots** menu; or right click the trigger record and select **Polar** from shortcut menu). Picture below shows polar plots of channel X and channel Y.



Plot Features:

- **Compensate or un-compensate the plot:** Click on toolbar.
- **View polar of different frequency components:** Click 1X, 2X on toolbar, or select the related commands (1X, 2X, NX) from **View** menu.
- **Display/hide polar of channel X (channel Y):** For polar plot generated by transient data under the dual-channel measurement point, by default, Display will show polar curves of both channel X and channel Y. To view polar plot of a single channel, click X or Y on toolbar.
- **Show Speed and Cross cursor:** Right click anywhere on the plot and select the related command from the shortcut menu. By default, **Show Speed** and **Show Cross Cursor** are marked.
  - ✓ **Show Speed:** Mark this command and then rotative speeds that related to the points on the curve will be shown.
  - ✓ **Show Cross Cursor:** With this command marked, the selected point on the curve will be shown with the black cross just like "+".
- **Select different point on the curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

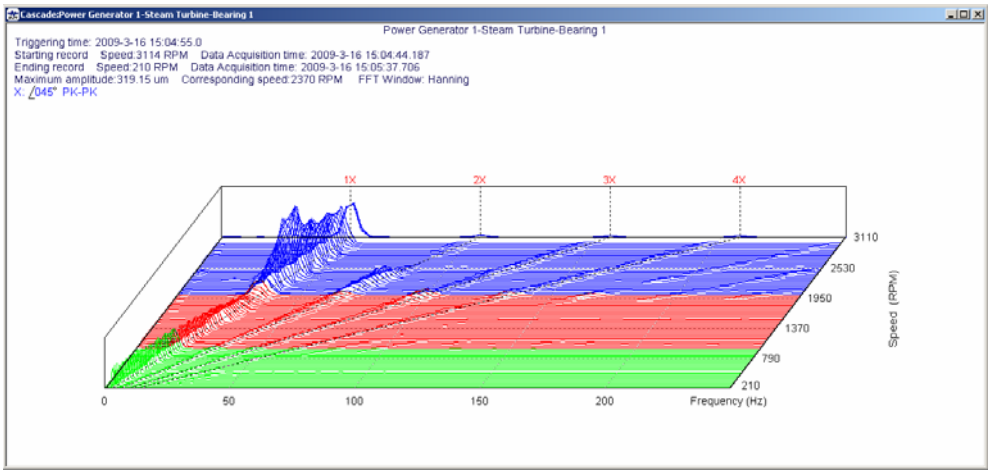
Cascade

Cascade plot displays a series of frequency spectra plotted as a function of shaft rotative speed. In PCM360 system, cascade plot is generated by signals collected during machine startup or coastdown (transient status). Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Transient samples	✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]

NOTE: The measurement point channel must map phase reference.

Display cascade plot: Ensure Display module is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on **Transient Trigger Record List view**, and finally click on toolbar (or select **Cascade** command from **Plots** menu; or right click the trigger record and select **Cascade** from shortcut menu). Picture below shows a cascade plot with channel X.



Plot Features:

- **Display/hide cascade of channel X (channel Y):** For cascade plot generated by transient data under the dual-channel measurement point, by default, Display will show cascade of channel X. Click X or Y on toolbar to view cascade plot based on data from channel X or channel Y.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

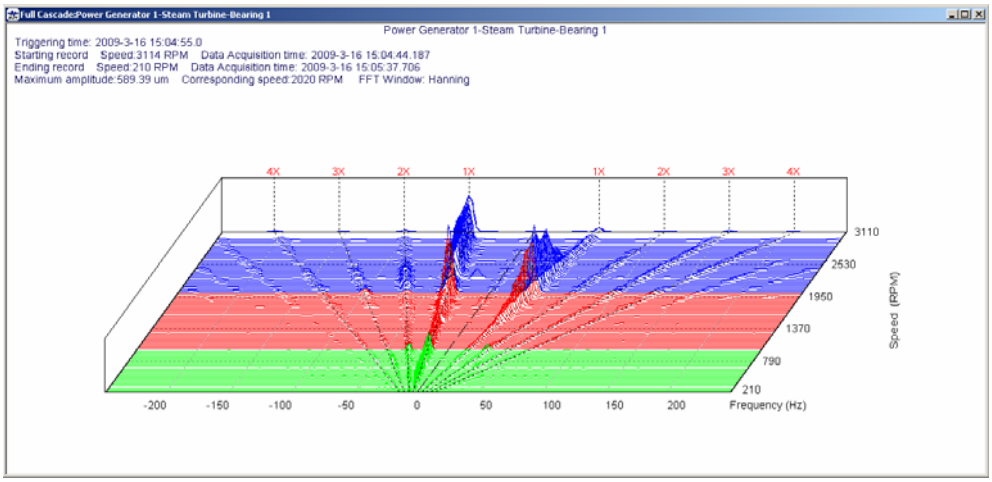
Full Cascade

Full cascade plot displays a series of full frequency spectra plotted as a function of shaft rotative speed, based on data from both channel X and channel Y. Full cascade plot is also generated by signals collected during machine startup or coastdown (transient status). Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Transient samples		✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]

NOTE: The measurement point channel must map phase reference.

Display full cascade plot: Ensure Display module is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on **Transient Trigger Record List view**, and finally click  on toolbar (or select **Full Cascade** command from **Plots** menu; or right click the trigger record and select **Full Cascade** from shortcut menu). Picture below shows a full cascade plot.



On full cascade plot, the frequency spectra in different rotative speed range could be displayed with different colors. That depends on the color definition for all transient plots on “Define the Color of Transient Plot” window.

Plot Feature:

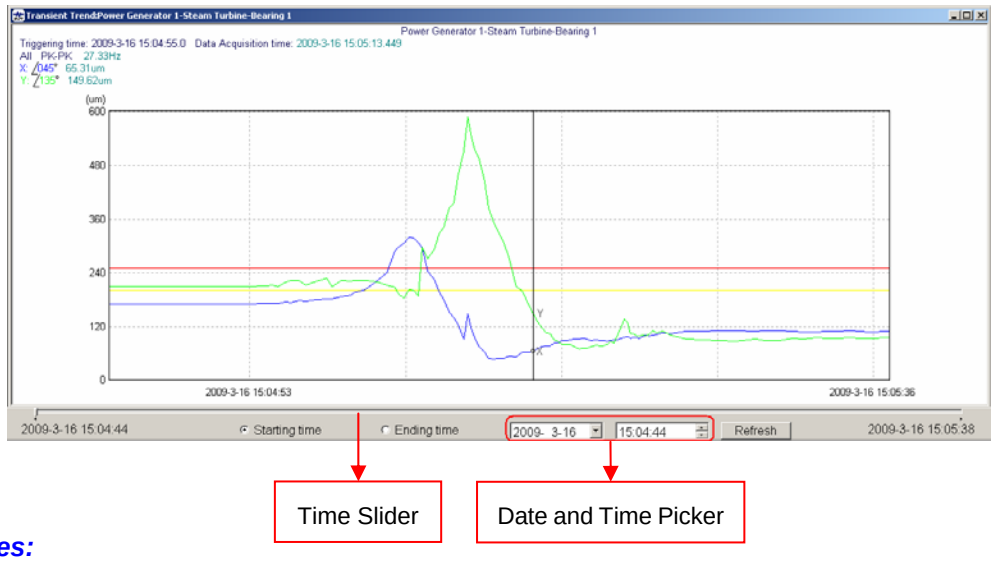
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Trend (Trs)

Transient trend plot is a presentation in Cartesian coordinates of a measured variable versus time, based on transient data from DAQ card's Acceleration, Velocity, or Vibration [from Prox] channel. Table below represents the relation between data, measurement point, device and channel type.

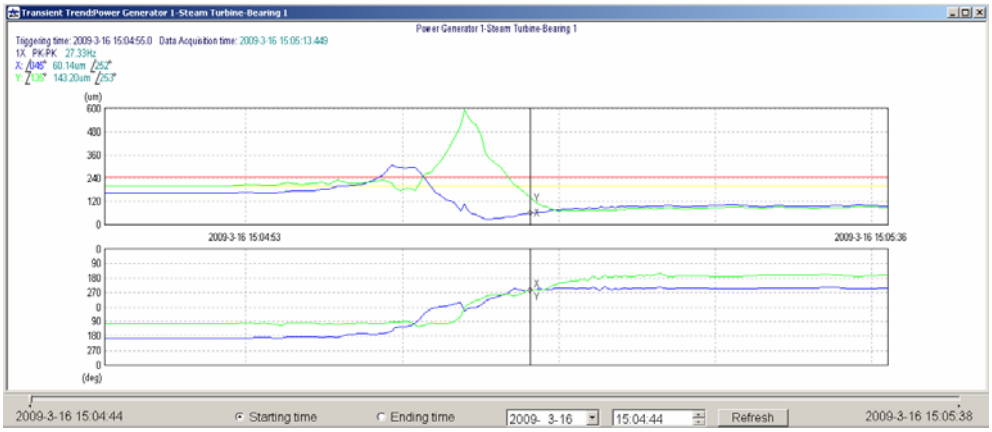
Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Transient samples	✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]

Display transient trend plot: Ensure Display module on local Display Terminal is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on the **Transient Trigger Record List view**, and finally click on toolbar (or select **Trend (Trs)** command from **Plots** menu; or right click the trigger record and select **Trend (Trs)** from shortcut menu). Picture below shows a transient trend plot with both channel X and channel Y.



Plot Features:

- **Auto full scale the transient trend:** Click on toolbar.
- **Magnify or restore the transient trend:** Use or on toolbar.
- **View transient trend plot of different frequency components:** Click All, 1X, 2X on toolbar, or select the related commands (All Frequency, 1X, 2X, NX, NOT1X) from **View** menu. When user views transient trend plot of 1X/2X/NX frequency component, Display software will also show the phase angle trend plot.

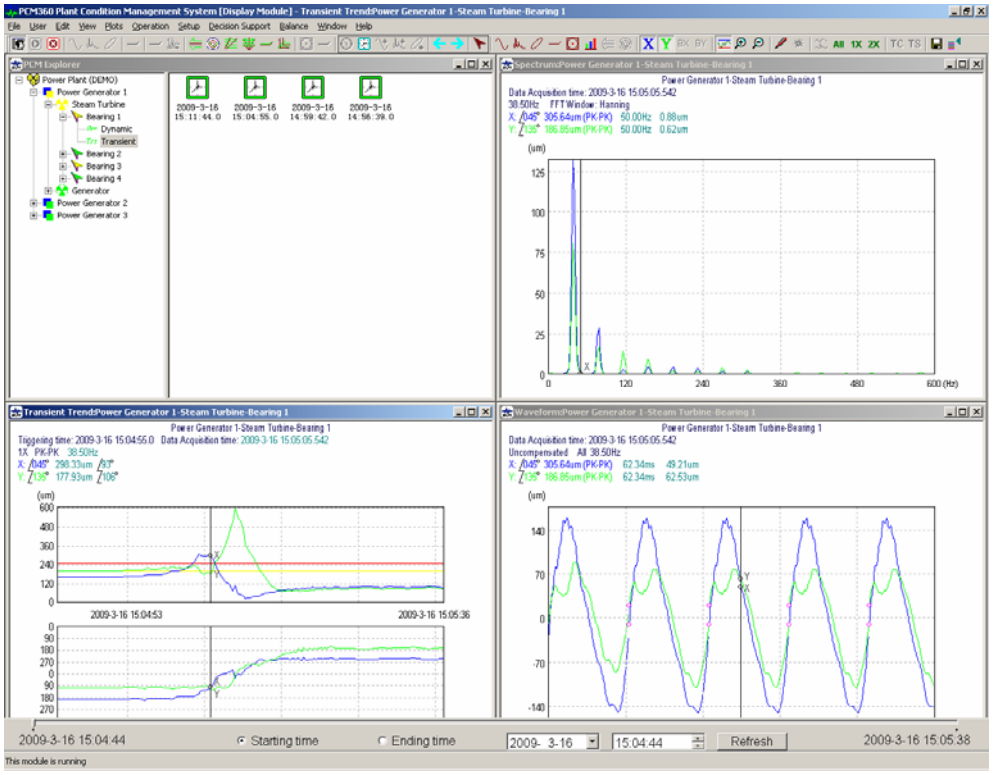


- **View Gap trend plot:** Click **Gap** command from **View** menu (or right click the plot and select **Gap** from the shortcut menu). The function only applies to trend generated by samples from DAQ card's Vibration [from Prox] measured channel.
- **Display/hide transient trend of channel X (channel Y):** For transient trend plot generated by transient samples under the dual-channel measurement point, by default the Display software will show transient trend plots of both channel X and channel Y. To view single channel's transient trend plot, click X and Y on toolbar.
- **View trend plot within selected time range:** User can view the trend plot in a time period. There are three methods to specify the time range.

  Method 1: Right click a point on the trend, and then select **Set Starting Time** from shortcut menu. The time that relates to this point is specified as the starting time. Set the ending time in the same way and finally click **Refresh** button.

  Method 2: Mark "Starting time", and directly select the time on the time slider. Then set the ending time in the same way and finally click **Refresh** button.

  Method 3: Mark "Starting time", and orderly select date and time from date and time picker. Then set the ending time in the same way and finally click **Refresh** button.
- **View waveform and spectrum of the sample:** Double click a point on the transient trend and then the waveform and spectrum plot of the sample associated with this point are displayed. By clicking or on toolbar, user can view the waveform and spectrum generated by the previous or the next transient sample, and the point cursor on the trend plot will move at the same time.



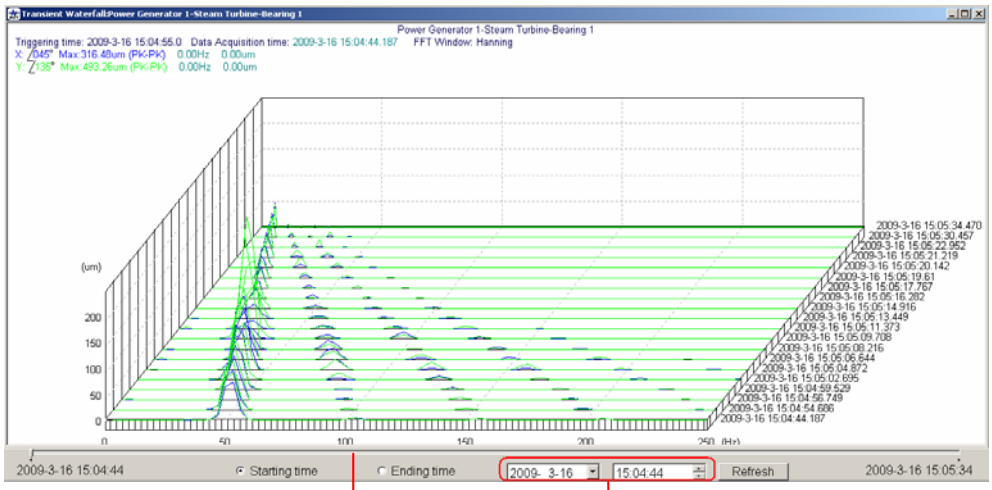
- **Select different point on the transient trend curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Waterfall (Trs)

Transient waterfall plot displays a stack of spectrum plots, based on transient samples taken over some period of time. Table below represents the relation between data, measurement point, device and channel type.

Data	Measurement Point		Device	Channel Type
	Single Channel	Dual Channel		
Transient samples	✓	✓	DAQ Card: 6013,6220, 6250	Acceleration, Velocity, Vibration [from Prox]

Display transient waterfall plot: Ensure Display module on local Display Terminal is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on the **Transient Trigger Record List view**, and finally click on toolbar (or select **Waterfall (Trs)** command from **Plots** menu; or right click the trigger record and select **Waterfall (Trs)** from shortcut menu). Picture below shows a transient waterfall plot with both channel X and channel Y.



Plot Features:

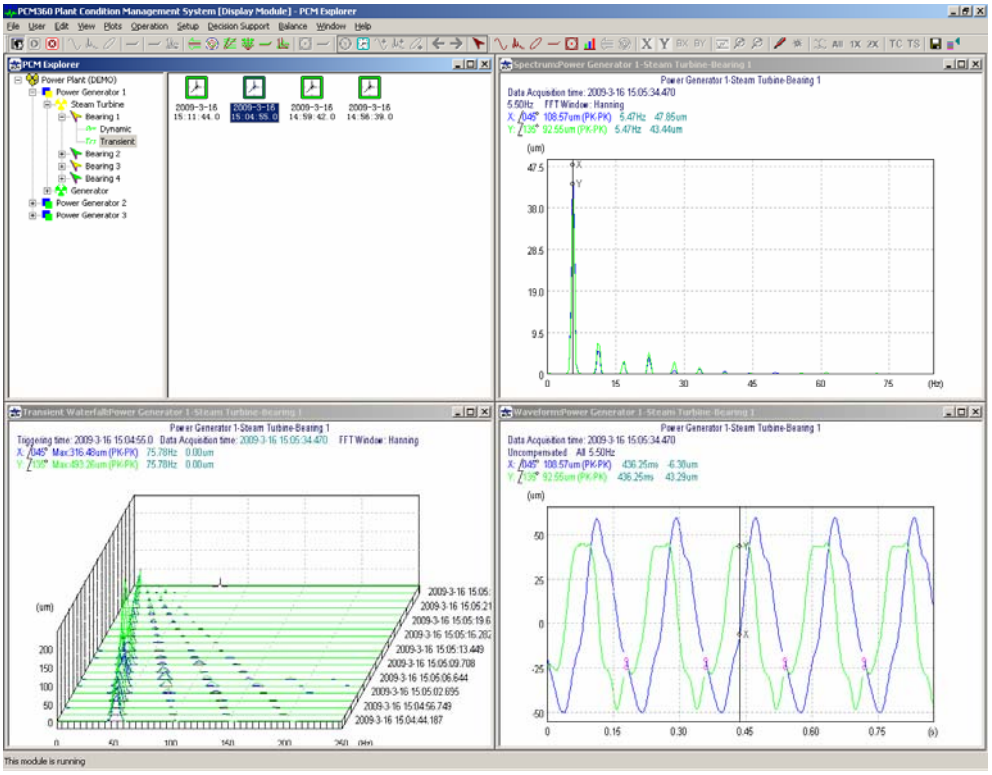
- **Auto full scale the transient waterfall:** Click on toolbar.
- **Display/hide transient waterfall of channel X (channel Y):** For transient waterfall generated by transient samples under the dual channel measurement points, by default the Display software will show transient waterfall plots of both channel X and channel Y. To view single channel's transient waterfall plot window, click X and Y on toolbar.
- **View waterfall plot within selected time range:** Similar to dynamic waterfall plot, user can view the transient waterfall plot in a time period. Two methods to specify the time range:

  Method 1: Mark "Starting time", and directly select the time on the time slider. Then set the ending time in the same way and finally click **Refresh** button.

  Method 2: Mark "Starting time", and orderly select date and time from date and time picker. Then set the ending time in the same way and finally click **Refresh** button.

By default, the number of the spectrum curve on the transient waterfall depends on the waterfall depth. When you change the display time range of the waterfall plot, the spectrum number may change. For example, you set the waterfall depth to 20 and currently only 19 transient samples were collected within the display time range, under this condition, Display software will display the waterfall generated by 19 spectrum curves.

- **View waveform and spectrum of the sample:** Double click a spectrum curve on the transient waterfall curve, and the waveform plot and spectrum plot of the sample associated with the spectrum curve are displayed.

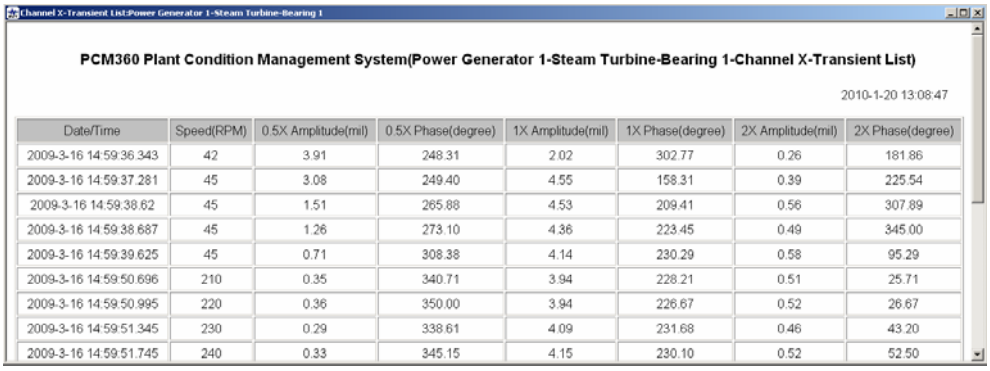


- **Select different point on the same spectrum curve:** Press Left or Right key on keyboard.
- **Save plot as *.bmp format:** Click **Save as *.bmp** command from **File** menu.

Transient List (Channel X)

Transient list (channel X) shows the information concerning the transient data from channel X of the selected measurement point that mapped DAQ card's Acceleration, Velocity, or Vibration [from Prox] channel.

View transient list of channel X: Ensure Display module on local Display Terminal is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on **Transient Trigger Record List view,** and finally you could either select **Transient List/Channel X** command from **Plots** menu or right click the trigger record and select **Transient List/Channel X** from shortcut menu. Picture below shows a transient list of channel X.



PCM360 Plant Condition Management System(Power Generator 1-Steam Turbine-Bearing 1-Channel X-Transient List)

2010-1-20 13:08:47

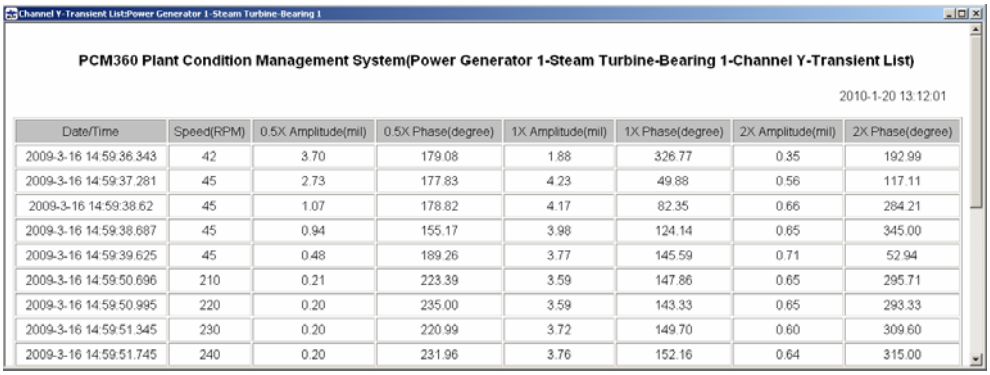
Date/Time	Speed(RPM)	0.5X Amplitude(mil)	0.5X Phase(degree)	1X Amplitude(mil)	1X Phase(degree)	2X Amplitude(mil)	2X Phase(degree)
2009-3-16 14:59:36.343	42	3.91	248.31	2.02	302.77	0.26	181.86
2009-3-16 14:59:37.281	45	3.08	249.40	4.55	158.31	0.39	225.54
2009-3-16 14:59:38.62	45	1.51	265.88	4.53	209.41	0.56	307.89
2009-3-16 14:59:38.687	45	1.26	273.10	4.36	223.45	0.49	345.00
2009-3-16 14:59:39.625	45	0.71	308.38	4.14	230.29	0.58	95.29
2009-3-16 14:59:50.696	210	0.35	340.71	3.94	228.21	0.51	25.71
2009-3-16 14:59:50.995	220	0.36	350.00	3.94	226.67	0.52	26.67
2009-3-16 14:59:51.345	230	0.29	338.61	4.09	231.68	0.46	43.20
2009-3-16 14:59:51.745	240	0.33	345.15	4.15	230.10	0.52	52.50

The information shown on the list includes collection time, rotative speed, amplitudes and phase angle that related to 0.5X, 1X, and 2X of transient data from channel X. Each page of the list displays up to 20 records. Click the left or right arrow button to see records on the next or previous page.

Transient List (Channel Y)

Transient list (channel Y) shows the information concerning transient data from channel Y of the selected measurement point that mapped DAQ card's Acceleration, Velocity, or Vibration [from Prox] channel.

View transient list of channel Y: Ensure Display module on local Display Terminal is started. From tree view, select Transient symbol under the measurement point first, and then select a transient trigger record on **Transient Trigger Record List view**, and finally you could either select **Transient List/Channel Y** command from **Plots** menu or right click the trigger record and select **Transient List/Channel Y** from shortcut menu. Picture below shows a transient list of channel Y.



PCM360 Plant Condition Management System(Power Generator 1-Steam Turbine-Bearing 1-Channel Y-Transient List)

2010-1-20 13:12:01

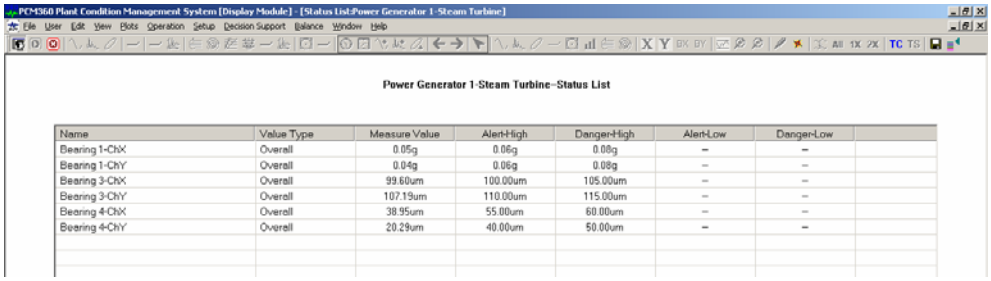
Date/Time	Speed(RPM)	0.5X Amplitude(mil)	0.5X Phase(degree)	1X Amplitude(mil)	1X Phase(degree)	2X Amplitude(mil)	2X Phase(degree)
2009-3-16 14:59:36.343	42	3.70	179.08	1.88	326.77	0.35	192.99
2009-3-16 14:59:37.281	45	2.73	177.83	4.23	49.88	0.56	117.11
2009-3-16 14:59:38.62	45	1.07	178.82	4.17	82.35	0.66	284.21
2009-3-16 14:59:38.687	45	0.94	155.17	3.98	124.14	0.65	345.00
2009-3-16 14:59:39.625	45	0.48	189.26	3.77	145.59	0.71	52.94
2009-3-16 14:59:50.696	210	0.21	223.39	3.59	147.86	0.65	295.71
2009-3-16 14:59:50.995	220	0.20	235.00	3.59	143.33	0.65	293.33
2009-3-16 14:59:51.345	230	0.20	220.99	3.72	149.70	0.60	309.60
2009-3-16 14:59:51.745	240	0.20	231.96	3.76	152.16	0.64	315.00

The information shown on the list includes collection time, rotative speed, amplitudes and phase angle that related to 0.5X, 1X, and 2X of transient data from channel Y. Each page of the list displays up to 20 records. Click the left or right arrow button to see records on the next or previous page.

Status List

Status list shows the real-time information concerning the machine train, machine and measurement point.

View status list: Ensure both DAQ and Display modules are started. From tree view, select the machine train (or machine, measurement point) and then select **Status List** command from **Plots** menu (or right click the node and then select **Status List** from shortcut menu). Picture below shows a status list of a machine train.

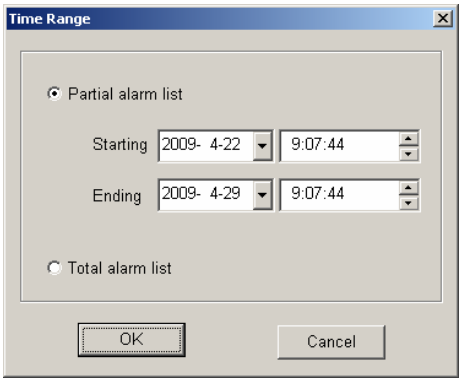

PCM360 Plant Condition Management System [Display Module] - [Status List:Power Generator 1-Steam Turbine]
File User Edit View Plots Operation Setup Decision Support Balance Window Help
Power Generator 1-Steam Turbine--Status List
Name Value Type Measure Value Alert-High Danger-High Alert-Low Danger-Low
Bearing 1-ChX Overall 0.05g 0.06g 0.08g – –
Bearing 1-ChY Overall 0.04g 0.06g 0.08g – –
Bearing 3-ChX Overall 99.60um 100.00um 105.00um – –
Bearing 3-ChY Overall 107.19um 110.00um 115.00um – –
Bearing 4-ChX Overall 38.95um 55.00um 60.00um – –
Bearing 4-ChY Overall 20.29um 40.00um 50.00um – –

The real-time information shown on the list includes value type (overall, 1X amplitude, 1X phase angle, 2X amplitude, 2X phase angle, and NOT1X amplitude), real-time measure value, and alarm set points of the measured channel.

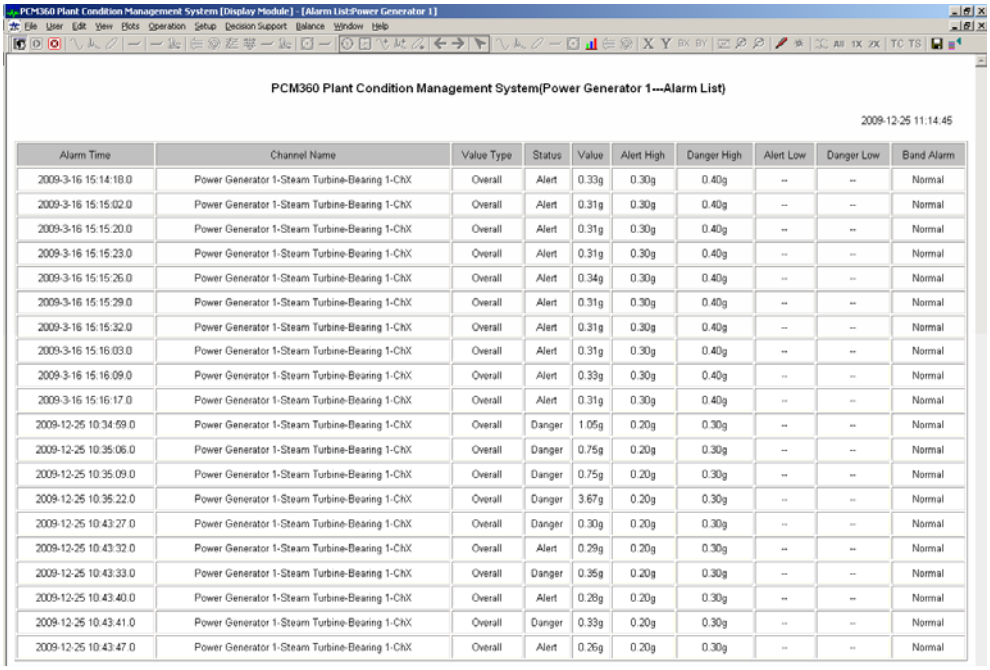
Alarm List

Alarm list shows the information concerning the alarm events of the machine train, machine, and measurement point.

View alarm list: Ensure Display module on local Display Terminal is started. From tree view, select the machine train (or machine, measurement point) and select **Alarm List** from **Plots** menu (or right click this node and select **Alarm List** from shortcut menu). On the launched "Time Range" window, select the time range of the alarm events you want to view and then click **OK** button.



Picture below shows a total alarm list.



PCM360 Plant Condition Management System(Power Generator 1---Alarm List)

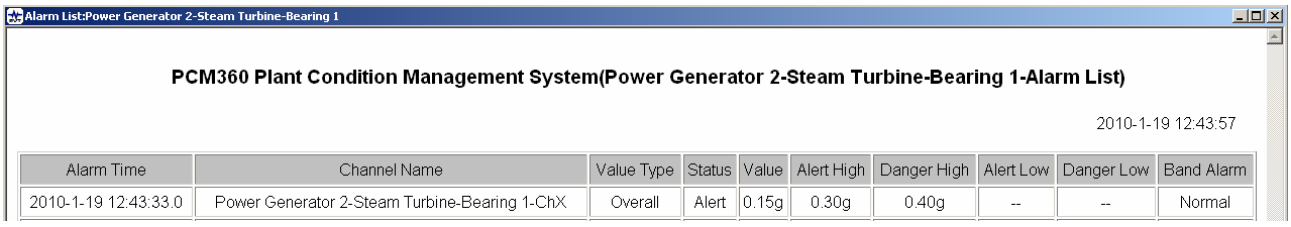
2009-12-25 11:14:45

Alarm Time	Channel Name	Value Type	Status	Value	Alert High	Danger High	Alert Low	Danger Low	Band Alarm
2009-3-16 15:14:18.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.33g	0.30g	0.40g	--	--	Normal
2009-3-16 15:15:02.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.31g	0.30g	0.40g	--	--	Normal
2009-3-16 15:15:20.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.31g	0.30g	0.40g	--	--	Normal
2009-3-16 15:15:23.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.31g	0.30g	0.40g	--	--	Normal
2009-3-16 15:15:26.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.34g	0.30g	0.40g	--	--	Normal
2009-3-16 15:15:29.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.31g	0.30g	0.40g	--	--	Normal
2009-3-16 15:15:32.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.31g	0.30g	0.40g	--	--	Normal
2009-3-16 15:16:03.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.31g	0.30g	0.40g	--	--	Normal
2009-3-16 15:16:09.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.33g	0.30g	0.40g	--	--	Normal
2009-3-16 15:16:17.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.31g	0.30g	0.40g	--	--	Normal
2009-12-25 10:34:59.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Danger	1.05g	0.20g	0.30g	--	--	Normal
2009-12-25 10:35:06.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Danger	0.75g	0.20g	0.30g	--	--	Normal
2009-12-25 10:35:09.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Danger	0.75g	0.20g	0.30g	--	--	Normal
2009-12-25 10:35:22.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Danger	3.67g	0.20g	0.30g	--	--	Normal
2009-12-25 10:43:27.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Danger	0.30g	0.20g	0.30g	--	--	Normal
2009-12-25 10:43:32.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.29g	0.20g	0.30g	--	--	Normal
2009-12-25 10:43:33.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Danger	0.35g	0.20g	0.30g	--	--	Normal
2009-12-25 10:43:40.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.28g	0.20g	0.30g	--	--	Normal
2009-12-25 10:43:41.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Danger	0.33g	0.20g	0.30g	--	--	Normal
2009-12-25 10:43:47.0	Power Generator 1-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.26g	0.20g	0.30g	--	--	Normal

Alarm list represents the alarm time of the alarm event, name of the alarmed channel, value type, the related measure value and alarm status, alarm set points, and the band alarm information. Each page of the list displays up to 20 records. Click the left or right arrow button to see records on the next or previous page.

- **Status column:** Indicate the alarmed channel's alarm severity. If the channel's measure value exceeded the danger set point, the alarm severity of this channel will be "Danger" and if the channel's measure value exceeded the alert set point but was less than danger set point, the alarm severity will be "Alert".
- **Band Alarm column:** Indicate the alarmed sample's band alarm condition. It will show "Alert" only when the alarmed sample is collected because of band alarm triggering. And if the value of this sample doesn't exceed alarm set points, its alarm status will show "Normal".

CAUTION: Sometimes you may see that the channel's alarm status is "Alert" or "Danger", whereas the measured value doesn't exceed alert set point. For example, see picture below: the channel's overall is 0.15g, which doesn't exceed alert set point with 0.30g, but its status is shown as "Alert" severity.



Alarm List:Power Generator 2-Steam Turbine-Bearing 1

PCM360 Plant Condition Management System(Power Generator 2-Steam Turbine-Bearing 1-Alarm List)

2010-1-19 12:43:57

Alarm Time	Channel Name	Value Type	Status	Value	Alert High	Danger High	Alert Low	Danger Low	Band Alarm
2010-1-19 12:43:33.0	Power Generator 2-Steam Turbine-Bearing 1-ChX	Overall	Alert	0.15g	0.30g	0.40g	--	--	Normal

The case may occurs under the condition that the DW device channel was set with “Alarm Latching” property. And once the channel alarmed, it will keep the alarm status unless the device is reset. As you see in the list above, though the channel’s measure value is in normal range now, it still alarms.

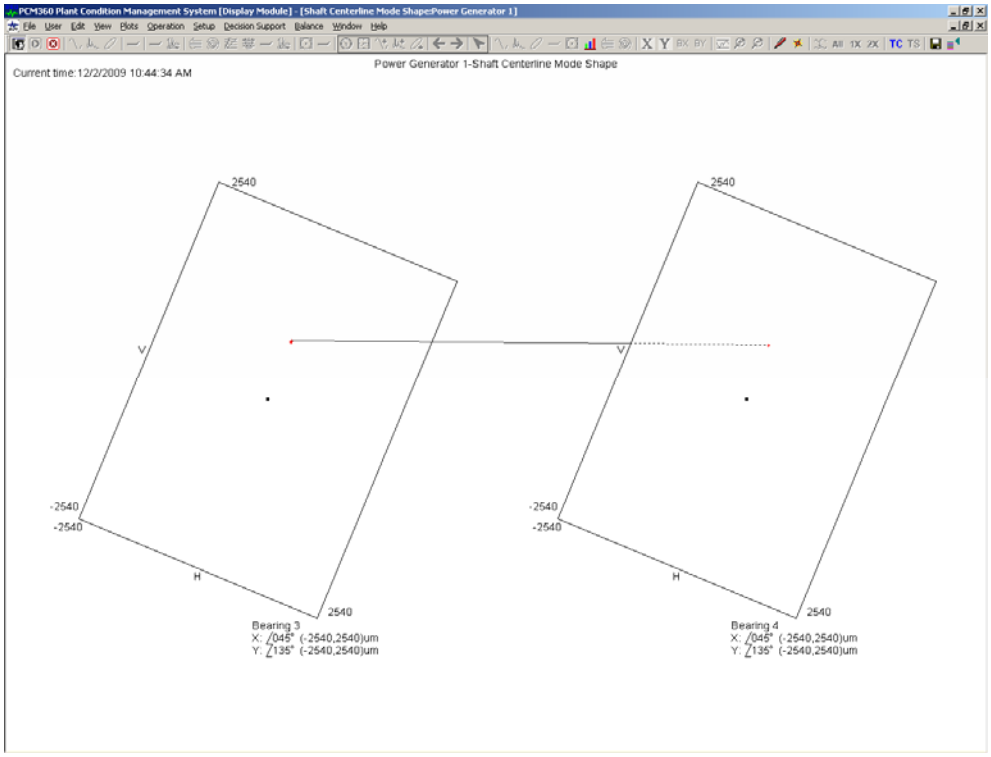
Shaft Centerline Mode Shape

Click this command to view the real-time shaft centerline mode shape of the measurement points under the selected machine train. Table below shows the measurement point that supports shaft centerline mode shape plot.

Measurement Point		Device	Channel Type
Single Channel	Dual Channel		
	✓	DAQ Card: 6013,6220, 6250	Vibration [from Prox]

Display shaft centerline mode shape: Ensure both DAQ and Display modules are started. From tree view, select a machine train and then select **Shaft Centerline Mode Shape** command from **Plots** menu (or right click the machine train and then select **Shaft Centerline Mode Shape** from shortcut menu).

By default, Display software will show the shaft centerline mode shape of all the available measurement points under the machine train. Even so, you can define the measurement points of which shaft centerline you want to view on the mode shape window. See ***PCM360 DISPLAY SOFTWARE OPERATION/View Menu/Shaft Mode Shape Setup/Mode Shape Setup for Shaft Centerline***.

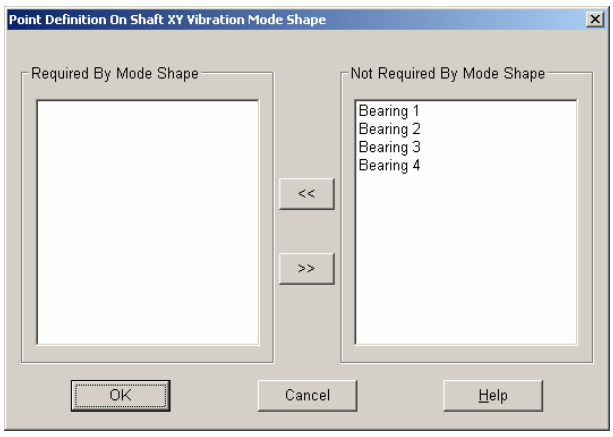


Shaft XY Vibration Mode Shape

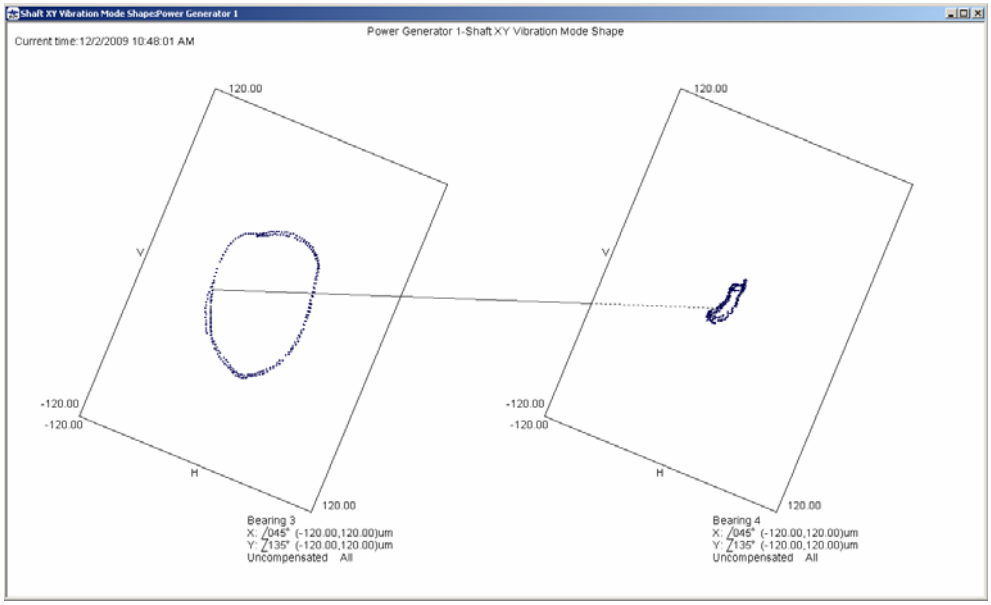
Click this command to view the real-time shaft XY vibration mode shape of the measurement points that mapped the same type of DAQ card's channels.

Display shaft XY vibration mode shape: Ensure both DAQ and Display modules are started. From tree view, select a machine train and then select **Shaft XY Vibration Mode Shape** command from **Plots** menu (or right click the machine train and then select **Shaft XY Vibration Mode Shape** from shortcut menu).

By default, Display software will launch the following window. And on this window, you can select the measurement points of which shaft XY vibration plot you want to view on the mode shape window.



"Not Required By Mode Shape" list shows the measurement points that support shaft XY vibration plot. Move the measurement point to "Required By Mode Shape" list and then click **OK** button. Picture below shows a shaft XY vibration mode shape of two measurement points that mapped DAQ card's Vibration [from Prox] channels. To view other measurement points' shaft XY vibration mode shape, select **Shaft Mode Shape Setup** command from **View** menu (See ***PCM360 DISPLAY SOFTWARE OPERATION/View Menu/Shaft Mode Shape Setup/Mode Shape Setup for Shaft XY Vibration***).



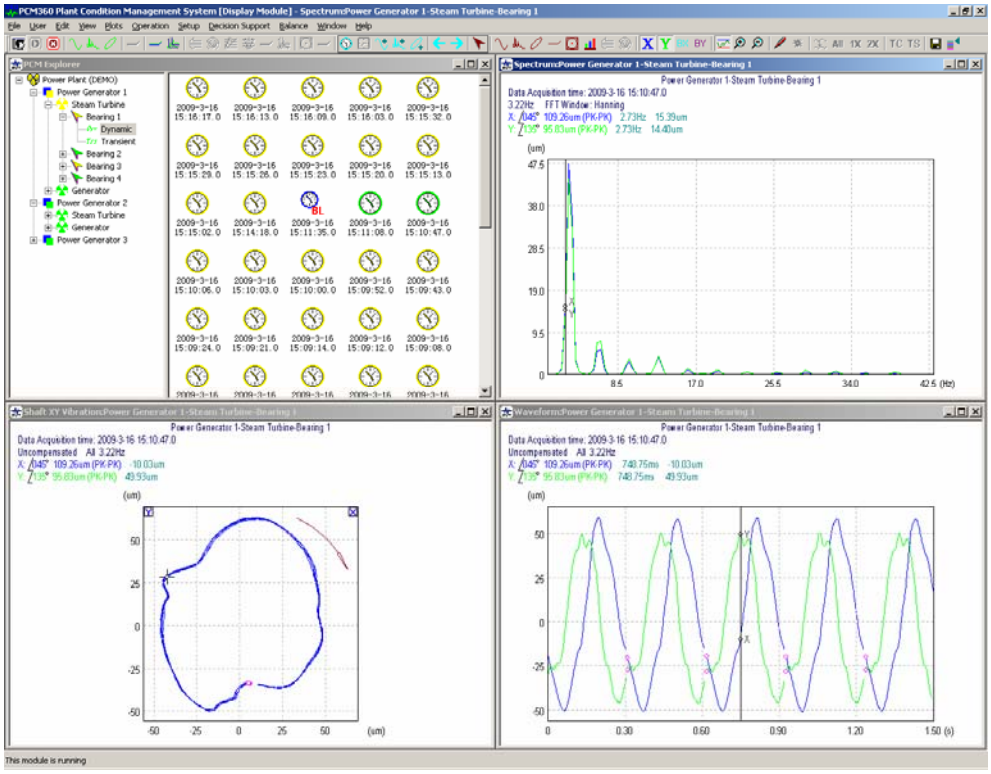
Plot Feature:

- **Auto full scale the plot:** Click on toolbar.

Plot Group (Sample)

Click this command to view plot group of a dynamic or transient sample. User defines the plot group on "Plot-Group Setup" window (select **Plot-Group Setup** command from **User** menu).

Display plot group of sample: Ensure Display module is started. Select the available sample first, and then directly click on toolbar (or select **Plot Group/Sample** command from **Plots** menu). Picture below shows a dynamic sample's plot group that contains waveform, spectrum and shaft XY vibration plots.

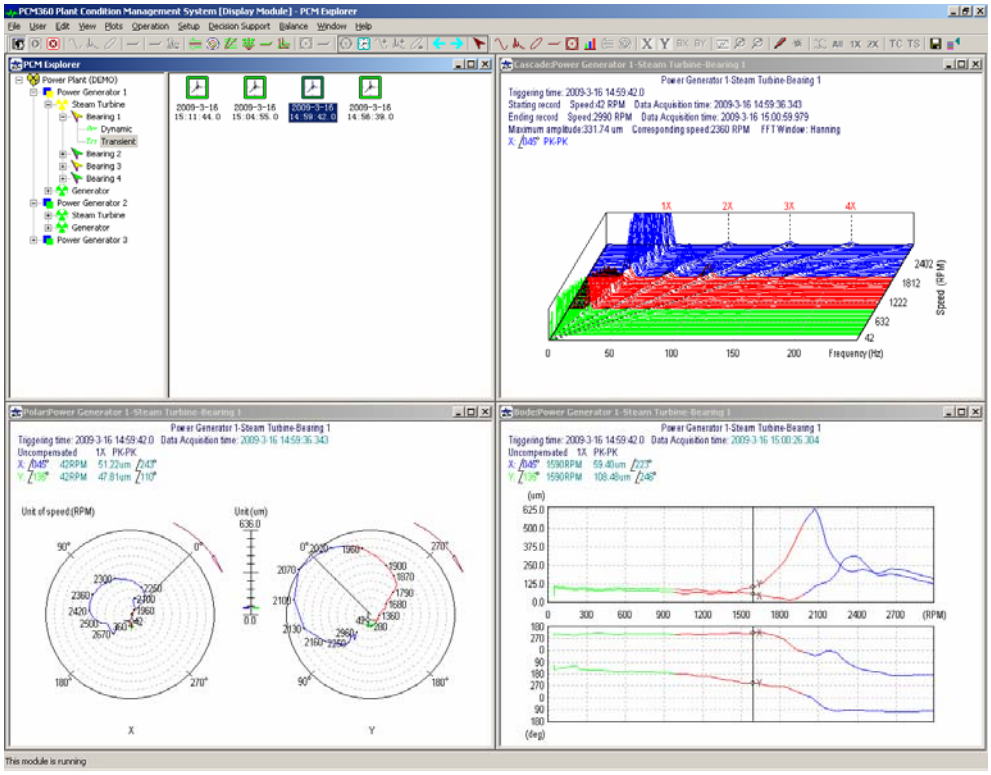


When viewing plot group of the selected sample, you can navigate to plot group of previous or next sample under the same (dynamic or transient) data set by clicking or on toolbar.

Plot Group (Transient Sample)

Click this command to view plot group of a transient data set. User defines the plot group on "Plot-Group Setup" window (select **Plot-Group Setup** command from **User** menu).

Display plot group of transient data set: Ensure Display module is started. Select a transient data set (transient trigger record) on **Transient Trigger Record List view**, and then directly click on toolbar (or select **Plot Group/Transient Sample** command from **Plots** menu). Picture below shows a transient data set's plot group that contains bode, polar and cascade plots.

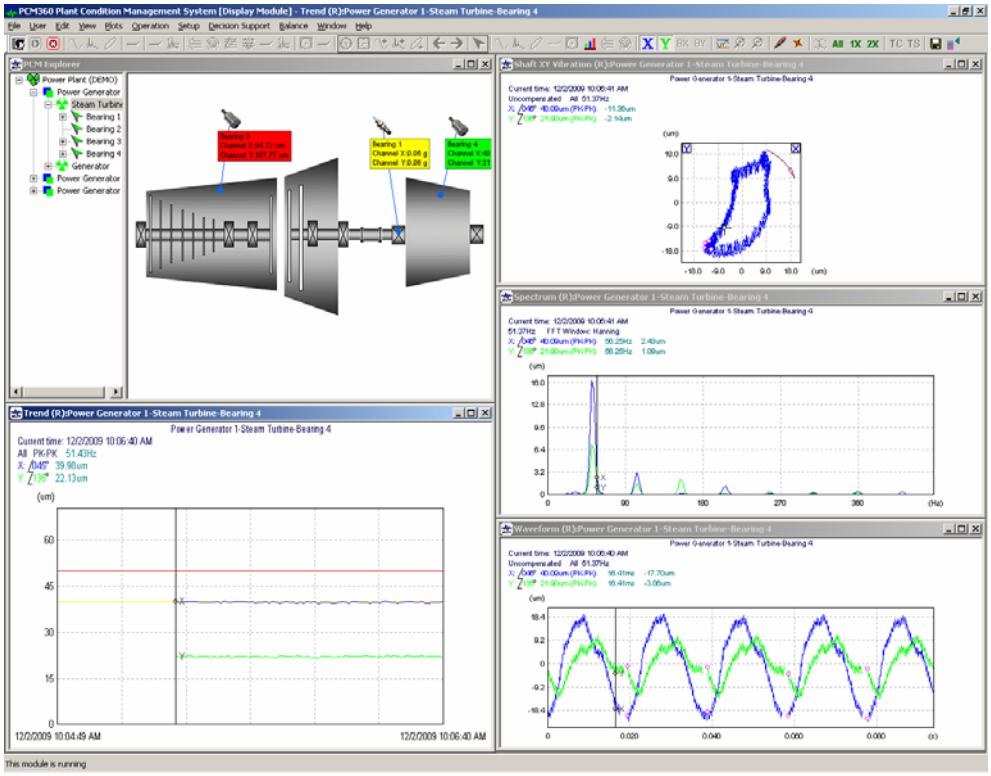


When viewing plot group of the selected transient data set, you can navigate to plot group of previous or next transient data set under the same measurement point by clicking or on toolbar.

Plot Group (Measurement Point)

Click this command to view a real-time plot group of a measurement point. User defines the plot group on "Plot-Group Setup" window (select **Plot-Group Setup** command from **User** menu).

Display real-time plot group of a measurement point: Ensure both DAQ and Display modules are started. From tree view, select the measurement point and then directly click on toolbar (or select **Plot Group/Measurement Point** command from **Plots** menu).

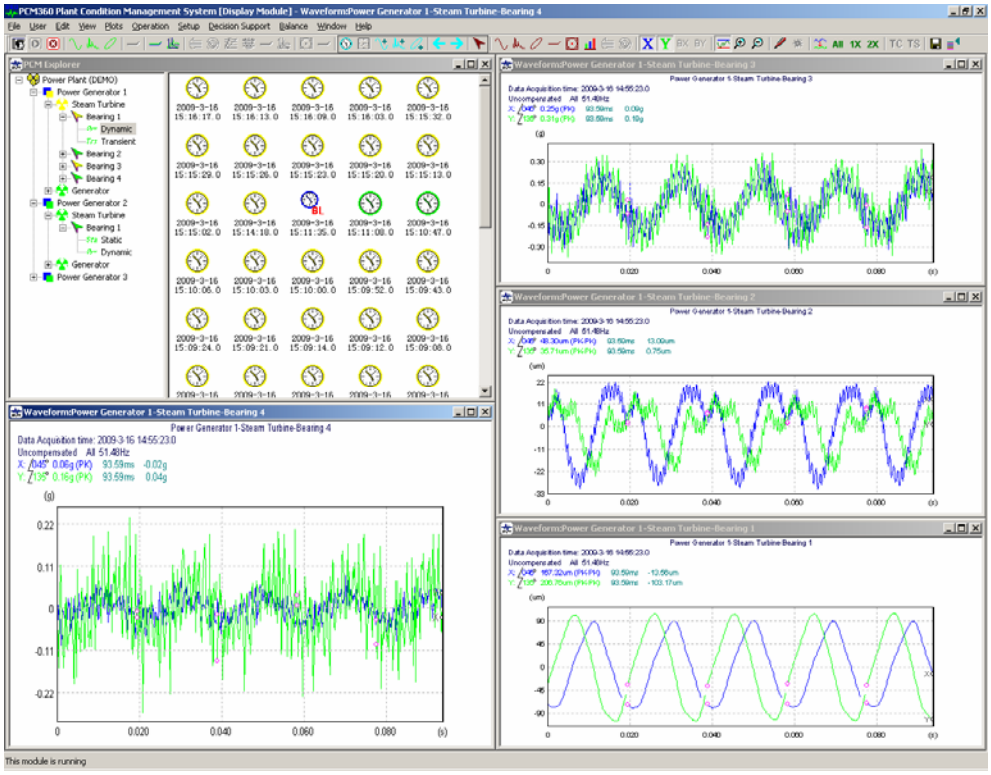


When viewing plot group of the selected measurement point, you can navigate to plot group of previous or next measurement point under the same machine by clicking or on toolbar.

Plot Group (Waveforms)

Click this command to view a group of waveform plots, based on dynamic samples of different measurement points under the same machine, moreover, those dynamic samples were collected at the same time.

Display waveform plot group: Ensure Display module on local Display Terminal is started. Select the dynamic sample and then directly click on toolbar (or select **Plot Group/Waveforms** command from **Plots** menu; or right click this sample and then select **Plot Group/Waveforms** from shortcut menu).

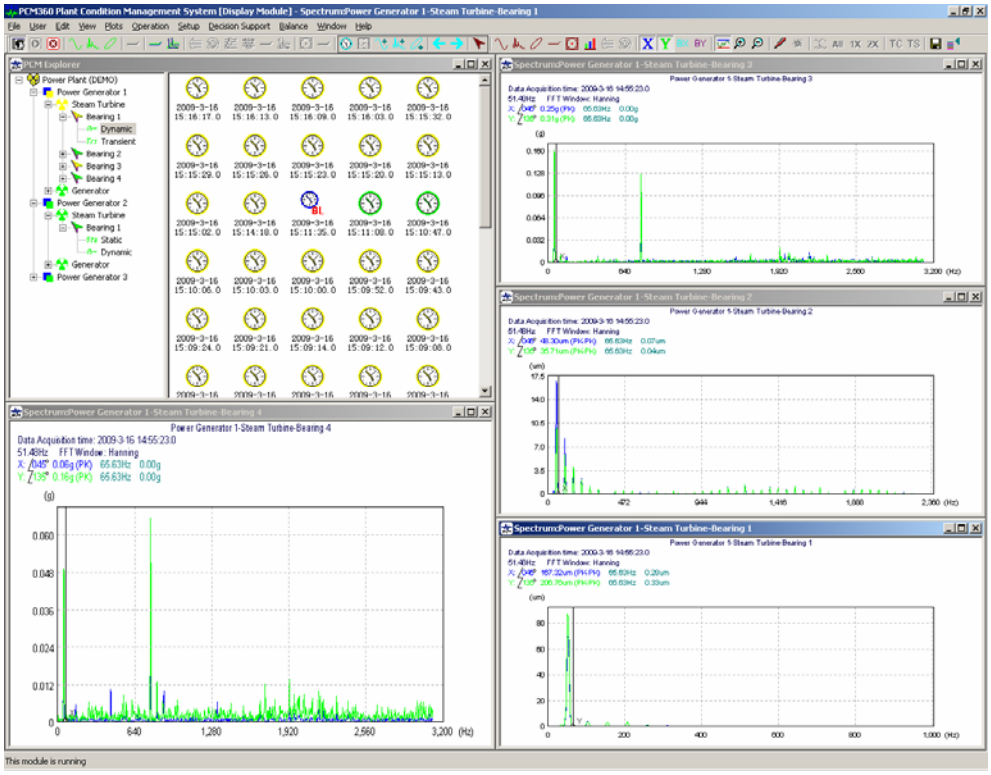


When viewing plot group of the selected dynamic samples, you can navigate to plot group of previous or next dynamic samples of different measurement points under the same machine by clicking or on toolbar.

Plot Group (Spectrums)

Click this command to view a group of spectrum plots, based on dynamic samples of different measurement points under the same machine, moreover, those dynamic samples were collected at the same time.

Display spectrum plot group: Ensure Display module on local Display Terminal is started. Select the dynamic sample and then directly click on toolbar (or select **Plot Group/Spectrums** command from **Plots** menu; or right click this sample and then select **Plot Group/Spectrums** from shortcut menu).

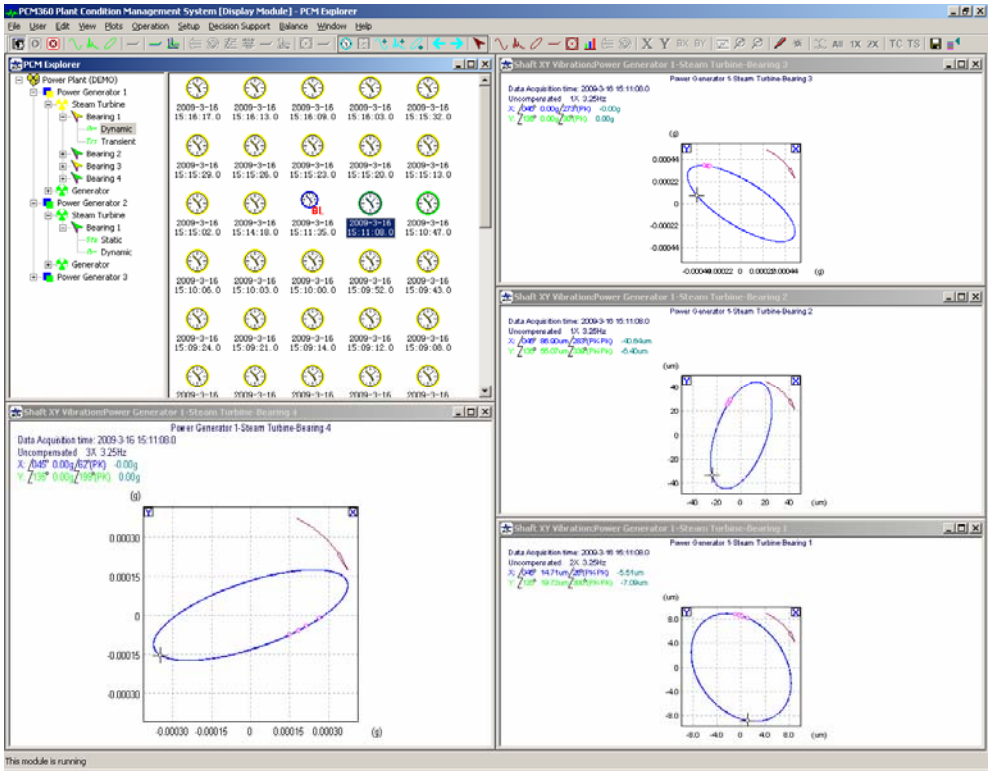


When viewing plot group of the selected dynamic samples, you can navigate to plot group of previous or next dynamic samples of different measurement points under the same machine by clicking or on toolbar.

Plot Group (Shaft XY Vibration)

Click this command to view a group of shaft XY vibration plots, based on dynamic samples of different measurement points under the same machine, moreover, those dynamic samples were collected at the same time.

Display shaft XY vibration plot group: Ensure Display module on local Display Terminal is started. Select the dynamic sample and then directly click on toolbar (or select **Plot Group/Shaft XY Vibration** command from **Plots** menu; or right click this sample and then select **Plot Group/Shaft XY Vibration** from shortcut menu).

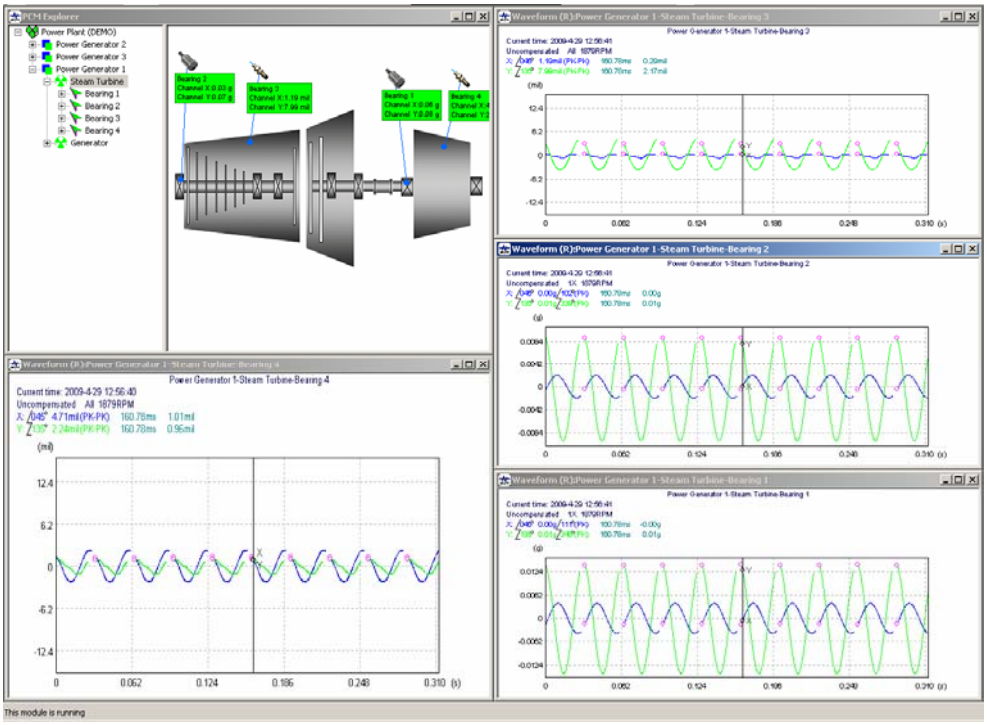


When viewing plot group of the selected dynamic samples, you can navigate to plot group of previous or next dynamic samples of different measurement points under the same machine by clicking or on toolbar.

Plot Group (Waveforms (R))

Click this command to view a group of real-time waveform plots, based on real-time data from measurement points under the same machine.

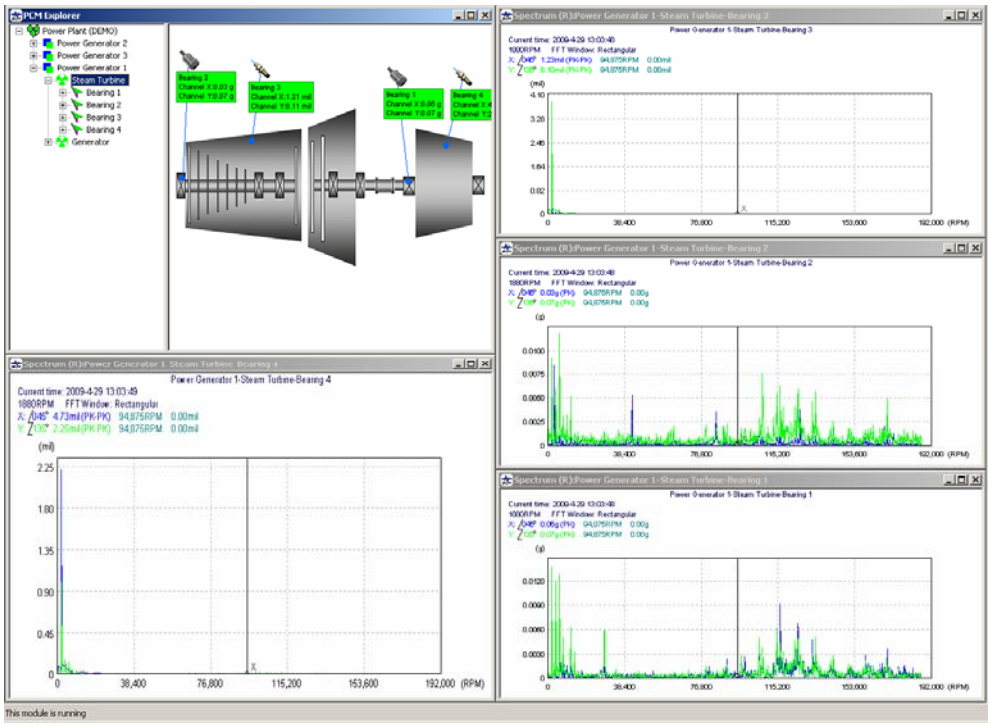
Display real-time waveform plot group: Ensure both DAQ and Display modules are started. From tree view, select a machine and then select **Plot Group/Waveforms (R)** command from **Plots** menu (or right click this machine and then select **Plot Group/Waveforms (R)** from shortcut menu).



Plot Group (Spectrums (R))

Click this command to view a group of real-time spectrum plots, based on real-time data from measurement points under the same machine.

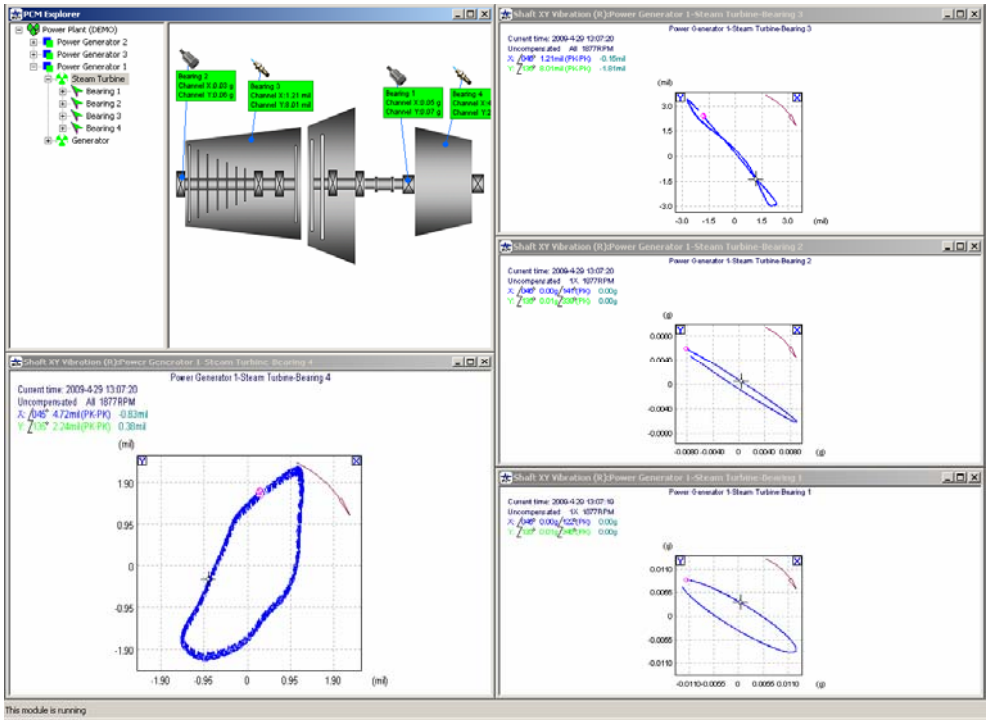
Display real-time spectrum plot group: Ensure both DAQ and Display modules are started. From tree view, select a machine and then select **Plot Group/Spectrums (R)** command from **Plots** menu (or right click this machine and then select **Plot Group/Spectrums (R)** from shortcut menu).



Plot Group (Shaft XY Vibration (R))

Click this command to view a group of real-time shaft XY vibration plots, based on real-time data from measurement points under the same machine.

Display real-time shaft XY vibration plot group: Ensure both DAQ and Display modules are started. From tree view, select a machine and then select **Plot Group/Shaft XY Vibration (R)** from **Plots** menu (or right click this machine and then select **Plot Group/Shaft XY Vibration (R)** from shortcut menu).



Operation Menu

Start Display Terminal

The command is used to start Display module. It has the same function with button on toolbar. You should ensure that the Display module was started if you want to view plots and do some particular operations such as start data acquisition, reset relays, etc.

Stop Display Terminal

The command is used to stop Display module. It has the same function with button on toolbar. When the Display module is stopped, user could set some parameters for the system such as network setup, system No., etc.

Start Static and Dynamic Data Acquisition

Click this command to manually collect the static and dynamic data of measurement points under the selected machine train. From tree view, select the machine train (ensure both DAQ and Display modules are started),

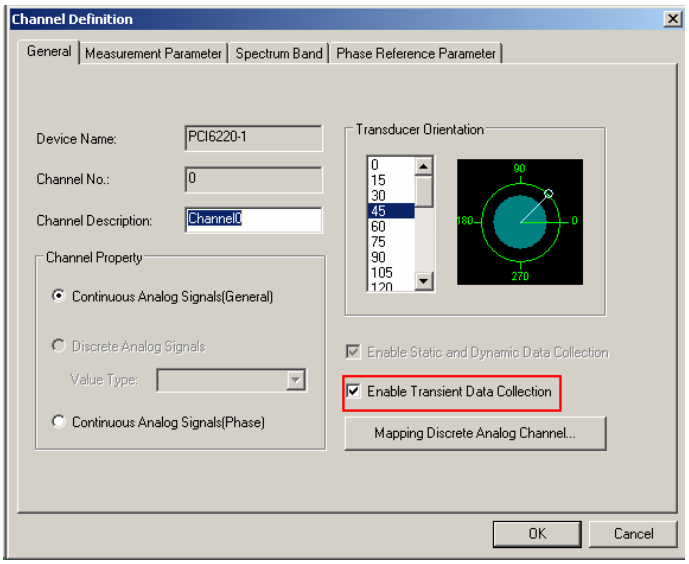
and then directly click  on toolbar (or select **Start Static and Dynamic Data Acquisition** command from **Operation** menu).

NOTE: For measurement points that are available to collect static and dynamic data, a static sample and a dynamic sample will be collected during a data collection; for measurement points that are only available to collect static or dynamic data, a static sample or a dynamic sample will be collected.

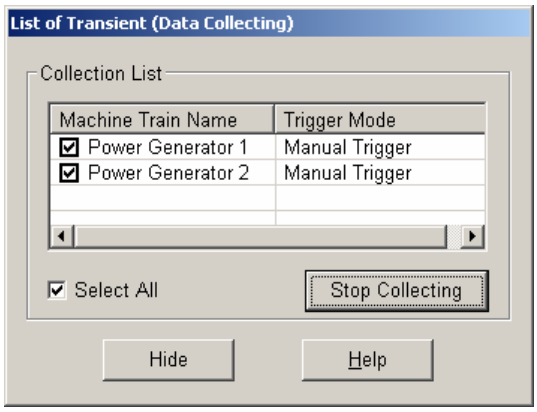
Start Transient Data Acquisition

Click this command to manually collect transient data of measurement points under the selected machine train. **Note** that the measurement points that are capable of collecting transient data must map the DAQ cards' channels with following properties:

1. The type of the channel must be “Acceleration”, “Velocity”, or “Vibration [from Prox]”;
2. The channel must be enabled to collect transient data (mark the “Enable Transient Data Collection” option on the “Channel Definition” window).



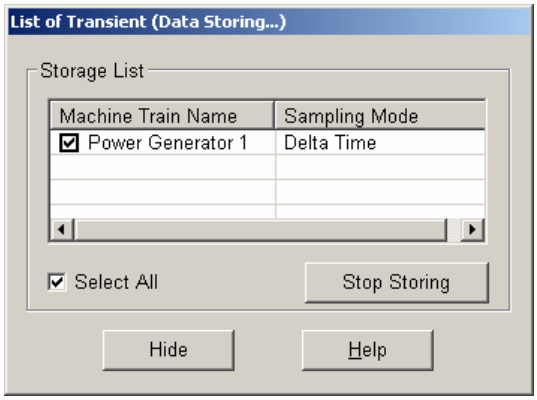
From tree view, select the machine train and then select **Start Transient Data Acquisition** command from **Operation** menu (ensure both DAQ and Display modules are started). Then Display software launches the “List of Transient (Data Collecting)” window and the selected machine train starts to collect transient data. When one machine train is collecting transient data, user can also manually trigger other machine trains to start transient data.



Stop Collecting (Button): Mark the check box before the machine train and then click **Stop Collecting** button to stop the data acquisition on the machine train. If "Select All" option is marked, all machine trains in the list will stop collecting transient data.

Hide (Button): Click this button to hide the current data collecting window.

After completed the collection process, Display software will sample the data and store them into the database.



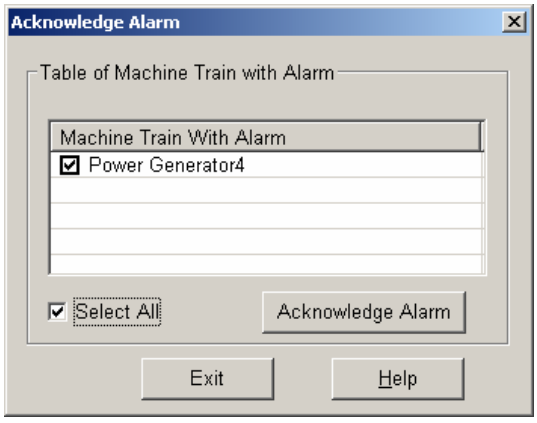
Stop Storing (Button): Mark the check box before the machine train and then click **Stop Storing** button to stop data storage on the machine train. If "Select All" option is marked, Display software will stop storing transient data of all machine trains in the list.

Hide (Button): Click this button to hide the current data storing window.

Acknowledge Alarm

The function allows user to acknowledge all alarms of machine trains. When alarm occurs, the function is activated (shortcut icon on toolbar is enabled), and meanwhile, the pictures' color bars of the alarmed machine train, machine and measurement point start to flash.

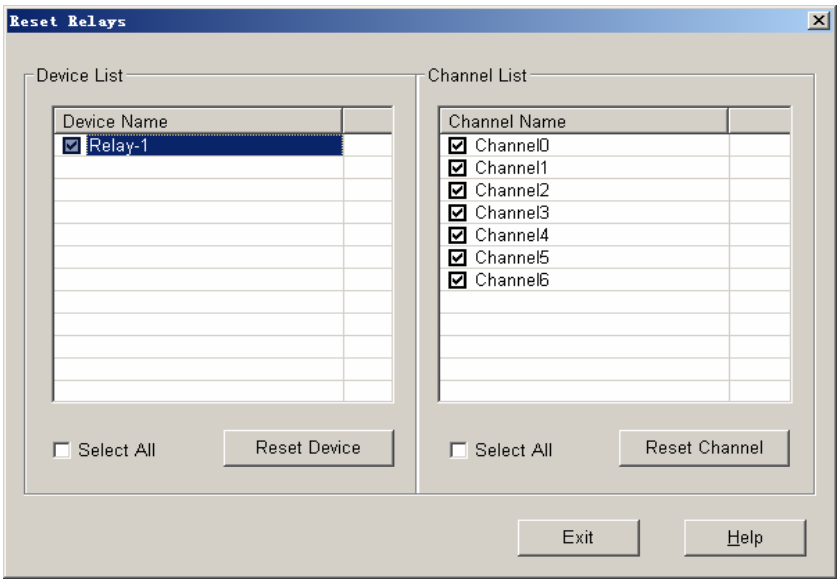
Click button on toolbar or select **Acknowledge Alarm** command from **Operation** menu, and then following window is launched.



All alarmed machine trains will be listed on the window above. Mark the check box before the machine train and click **Acknowledge Alarm** button to acknowledge the alarm of this machine train. By default, “Select All” will be marked, and clicking **Acknowledge Alarm** button will acknowledge alarms of all machine trains. When alarm is acknowledged and the alarm status of related machine train returns to normal, the picture bar of the alarmed machine train will stop flashing.

Reset Relays

The command is used to reset the latched and alarmed relay channels. Ensure both DAQ and Display modules are started. Click this command will launch the “Reset Relays” window.



Device List: List all relays in current PCM360 system.

Channel List: Select a relay from “Device List” and channels that are set to “Latched” property of this relay will be listed.

- **Select All (Check box), Reset Device (Button)**

To reset a relay: Mark the check box before a relay and click **Reset Device** button.

To reset all relays: Mark “Select All” under “Device List” and click **Reset Device** button.

- **Select All (Check box), Reset Channel (Button)**

To reset a channel: Mark the check box before a channel and click **Reset Channel** button.

To reset all channels of the relay: Mark “Select All” under “Channel List” and click **Reset Channel** button.

Search Phase Reference

Click this command to search the phase reference. Ensure both DAQ and Display modules are started, and then click this command to update the phase reference. The whole process may take you about 20 seconds. **Note** that this command only applies to measurement points that mapped channels of DAQ card, and it works only when the trigger mode of the related phase reference channel is set to “Auto Trigger”.

Resampling the Last Transient Data

The command is used to resample the last transient data by re-setting sampling parameters of the collected transient data.

Ensure Display module on local Display Terminal is started. From tree view, select the machine train and click **Resampling the last Transient Data** command from **Operation** menu. Then “Transient Data Collection Setup” window will be launched. User could set the sampling mode on this window to re-sample the last transient data set. After the operation, the data set of all measurement points under the selected machine train will be resampled.

CATUION: Do not change the settings on the related DAQ channels before you re-sample the transient data.

Define Baseline

Baseline sample is a dynamic collection of data that is taken at a particular time to provide sample data for a particular machine condition. You can compare other samples with this baseline sample under the same measurement point to see if they have deviated enough to cause concern.

Define Baseline sample: Ensure Display module is started. Select a dynamic sample under a measurement point, and then select **Define Baseline** command from **Operation** menu (or right click this sample and then select **Define Baseline** from shortcut menu). The baseline sample is marked with red symbol **BL** just like picture shown below.



NOTE: User could only define one baseline sample for a measurement point.

Define Slow-Roll

Slow-roll is such sample that is collected at the low rotative speed of a rotor, at which dynamic motion effects from forces are negligible because the motion is always seen as defects of the rotor. Slow-roll could be taken to compensate the plots at the same vector.

Define Slow-Roll sample: Ensure Display module is started. Select a dynamic sample or transient sample under the measurement point and then select **Define Slow-Roll** command from **Operation** menu (or right click this sample and then select **Define Slow-Roll** from shortcut menu). The slow-roll sample is marked with red symbol **SR** just like picture shown below.



NOTES:

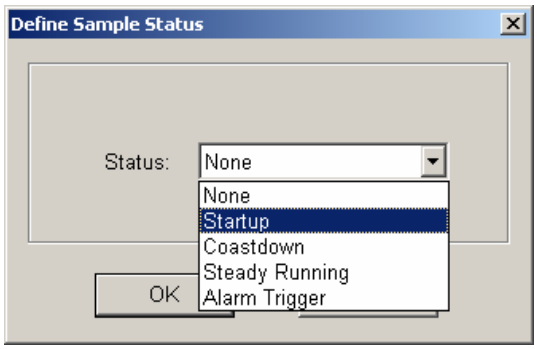
1. Phase reference channel must be set before slow-roll sample is defined.
2. Only the sample from measurement points that mapped DAQ card's Acceleration, Velocity, or Vibration [from Prox] channel can be defined as slow-roll sample.
3. User could only define one slow-roll sample for a measurement point.

4. Another method to define slow-roll sample: Right click a bode plot, and then select the related command. See ***PCM360 Display Software Operation/Plots Menu/Bode*** for details.

Define Sample Status

The command is used to set status for dynamic sample and transient sample.

Ensure Display module is stopped. From Dynamic Data list view, select a dynamic sample (or from Transient Trigger Record list view, select a transient trigger record), and click this command from **Setup** menu. "Define Sample Status" window is launched.



On the window above, specify a status for the sample and then click **OK** button.

You can view the status information of the data on Graphics View by details display mode. And you could also select to view the historical data with specified status on Display Terminal. See ***PCM360 Display Software Operation/User Menu/Select Status for Historical Data View*** of this manual to get more details.

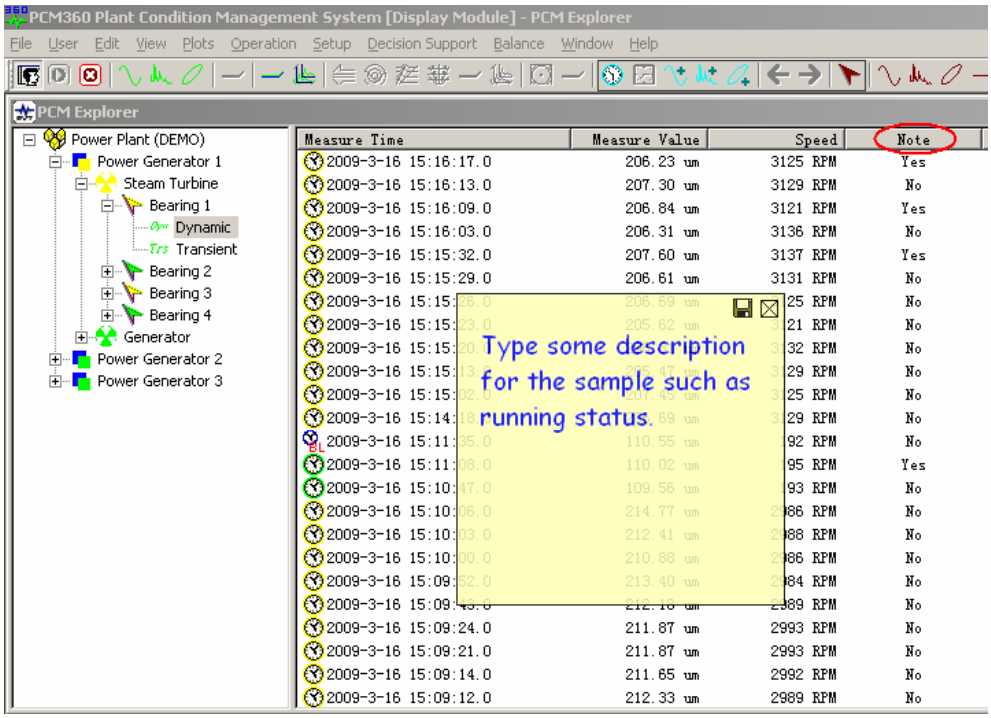
NOTES:

1. If you change the status of the sample to "None" status, the sample's former status information will be deleted i.e. the sample will has no status.
2. You can't set status only for a transient sample. If you want to set or change a transient sample's status, you should select the transient trigger record the sample belongs to, and click this command. Then all these transient samples will be labeled with this status.

Add Note

The function allows user to attach a special description to the dynamic or transient sample for future viewing.

Select an available sample, and click **Add Note** command from **Operation** menu (or right click the sample and select **Add Note** from shortcut menu). Then a yellow note will be launched and user can type comments of the selected sample. Finally click button on the note to save the comments.



After added a note for a sample, the Note column will show “Yes” in dynamic or transient data list view displayed by details mode.

NOTES:

1. Each dynamic or transient sample could be added only one note.
2. User is allowed to add a note for the sample when viewing its historical waveform, spectrum and shaft XY vibration plots (right click the plot and select **Add Note** from shortcut menu).

Show Note

The command is used to view and modify the note of the sample.

Select the sample that has a note and then click **Show Note** command from **Operation** menu (or right click the sample and select **Show Note** from shortcut menu). Then a yellow note will be launched and user can modify the comments of the selected sample. Finally click button to save the note.

NOTE: User is allowed to show and modify the note when viewing historical waveform, spectrum and shaft XY vibration plots of the sample (right click the plot and select **Show Note** from shortcut menu).

Delete Note

The command is used to delete the note of the sample.

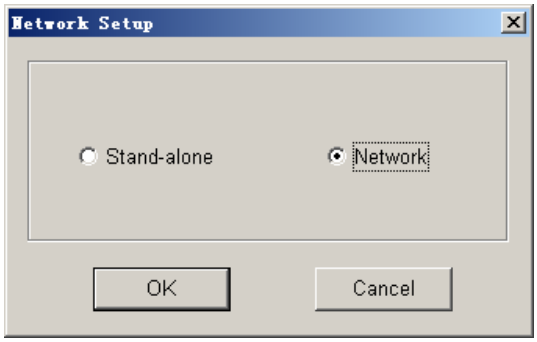
Select the sample that has a note and then click **Delete Note** command from **Operation** menu (or right click the sample and select **Delete Note** from shortcut menu). Then a message box will be launched. Click **Yes** button to confirm to delete the note.

NOTE: User is allowed to delete the note when viewing historical waveform, spectrum and shaft XY vibration plots of the sample (right click the plot and select **Delete Note** from shortcut menu).

Setup Menu

Network Setup

Use this command to change setting on network selection of PCM360 system. The default is “Network”. To change it to “Stand-alone”, select **Network Setup** from **Setup** menu (ensure Display module is stopped).



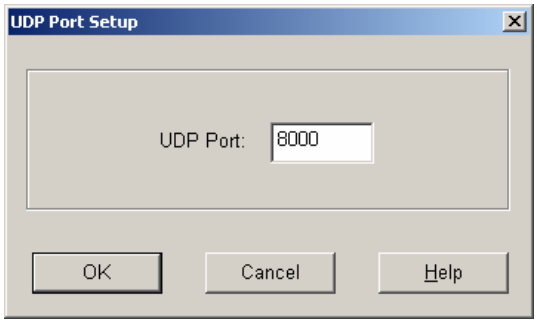
Select “Stand-alone” and then click **OK** button, finally, re-start Display module on local computer.

UDP Port Setup

Click this command to set the available UDP port (ensure the Display module is stopped). When the system UDP port is used by other application program, a message box will be launched to inform you.



Under this condition, you should assign another UDP port for PCM360 system. To re-set the UDP port, ensure the DAQ module is stopped.



Type the available UDP port in the edit box and click **OK** button.

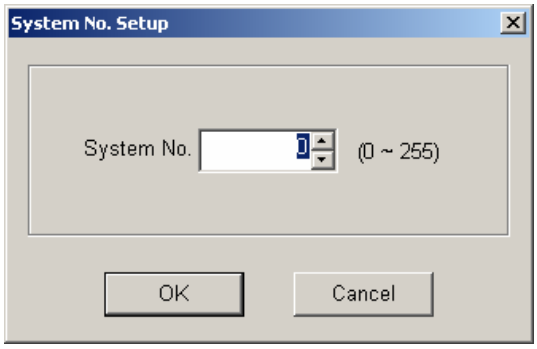
CAUTION: To apply the new UDP port, after re-set the system UDP port, you must exit PCM360 software (contains DAQ&COM, Display, Server, and Web Server), and then re-run them.

System No. Setup

Click this command to open “System No. Setup” window (ensure Display module is stopped). The function is used to specify a system No. for current PCM360 system.

System No.: It is used to identify the unique PCM360 system when there are multi-PCM360 systems in the same local network.

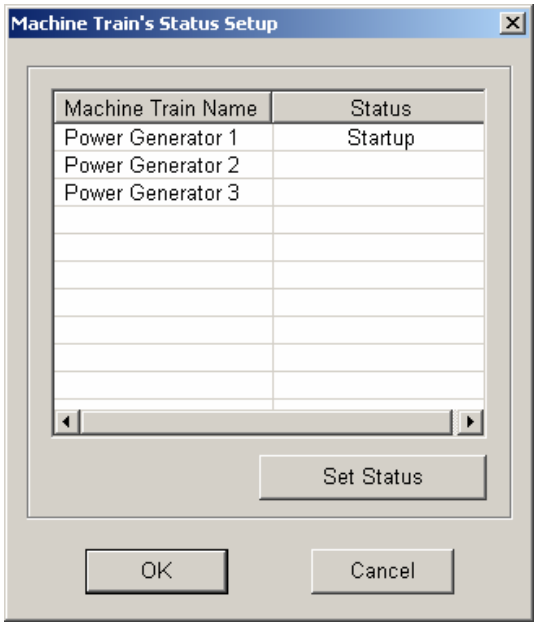
By default, the system No. will be set to “0”. If user wants to specify another No. for the current system, type the new number in the edit box, and then click **OK** button to save the number.



CAUTION: To apply the new system No., after re-specify the system No., you must exit PCM360 software (contains DAQ&COM, Display, Server, and Web Server), and then re-run them.

Machine Train's Status Setup

After defined status by DAQ software, user could set status for each machine train by clicking this command from **Setup** menu.



- **Machine Train Name (List)**

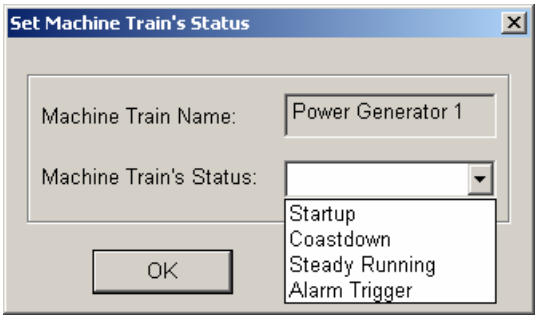
List all machine trains in current PCM360 system.

- **Status (List)**

List the status of the related machine train. You set the status for each machine train by clicking **Set Status** button. The machine train has no status before it is first set, so the status will be shown as empty.

- **Set Status (Button)**

Select a machine train from the list and click this button to specify a status for the current machine train. All statuses you added on "Define Status" window will be displayed in "Machine Train's Status" combo box. See picture below:



When the machine train is triggered to collect data after the status was set, the collected data will be labeled this status. User on Display Terminal can view the historical data only with the specified status. See ***PCM360 Display Software Operation/User Menu/Select Status for Historical Data View*** of this manual to get more details.

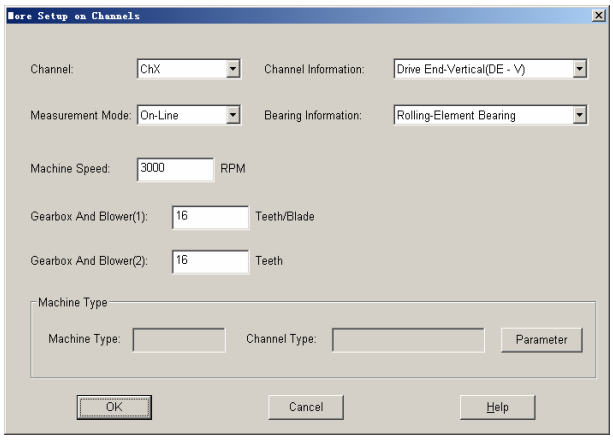
Decision Support Menu

Decision support menu provides expert assist function for user. Different types of reference data in different local conditions are defined and saved in standard database. The local expert can change the standard database according to the requirement of the local field. PCM360 system records the alarm data and analyzes them. With those commands, PCM360 can predict the defect name, calculates defect possibility and severity, and also gives a suggestion action.

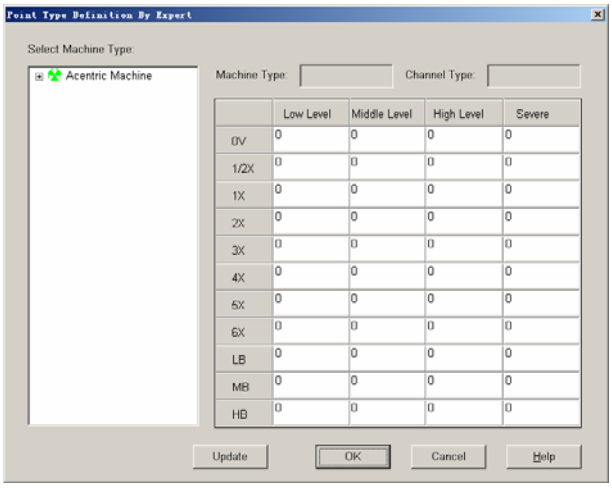
More Setup on Channels

Use this command to define additional parameters for every measurement point.

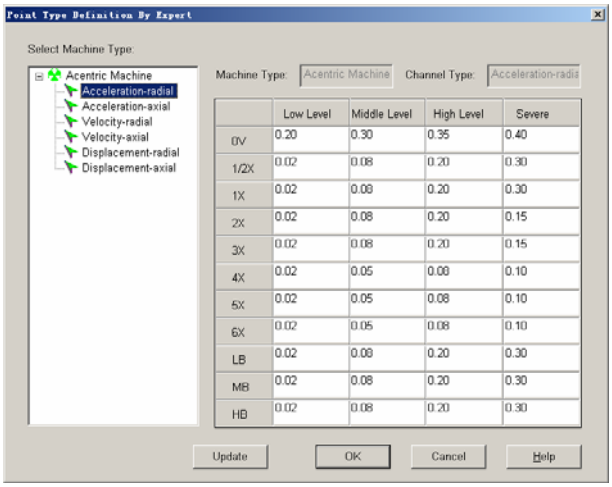
1. Select a measurement point from tree view (ensure Display module on local Display Terminal is stopped), and then select **More Setup on Channels** command from **Decision Support** menu.



2. Type the parameters in related edit box and then click **Parameter** button.

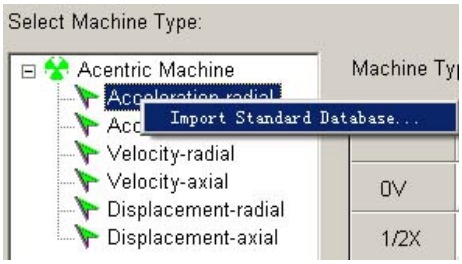


3. Select a machine type and channel type.



4. You can change the parameters value in the related blank, and to save the change, click **Update** button.

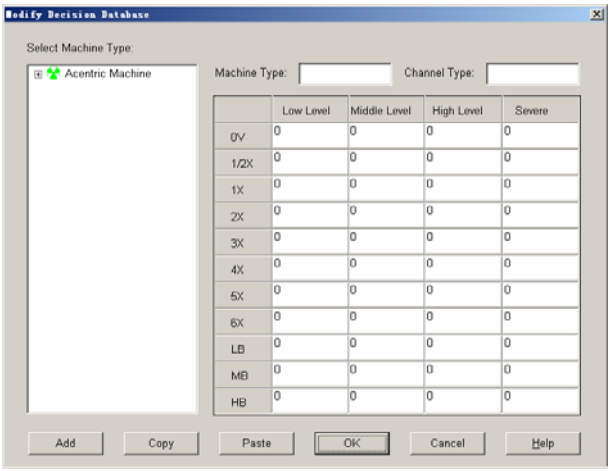
   To set the current channel data as the decision database data, select a channel type (or a machine) first, right click this channel type, and then click **Import Standard Database** button.



5. Finally, click **OK** button.

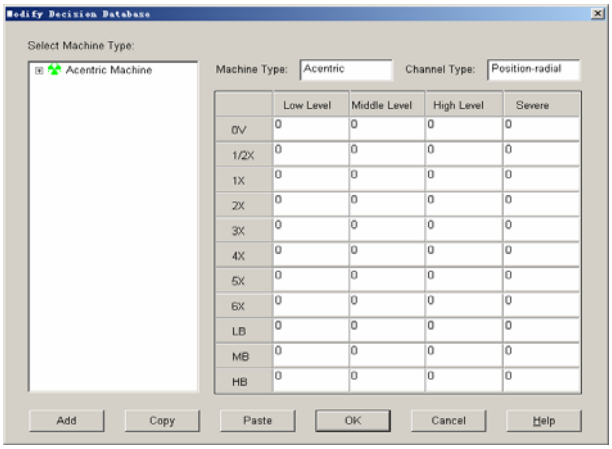
Modify Decision Database

Use this command to change decision database. Select **Modify Decision Database** command from **Decision Support** menu (ensure Display module on local Display Terminal is stopped).

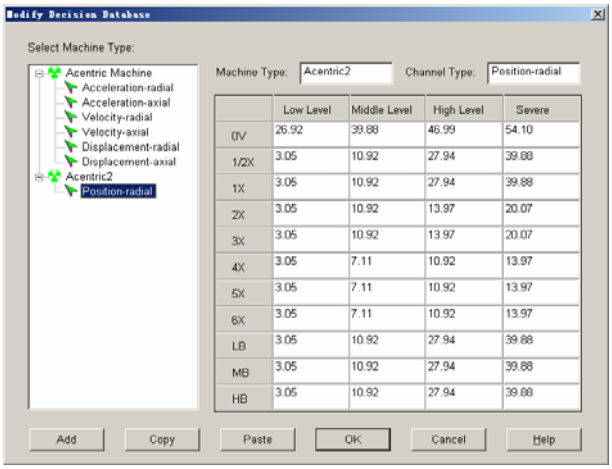


- **Add (Button):** Add decision data about a new machine type or a channel type:

1. Input name for the new machine type or channel type.

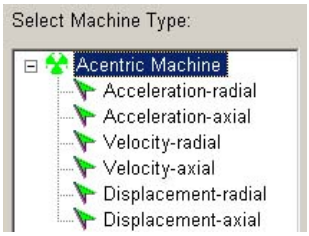


2. Input decision data in related blanks. And then click **OK** button.

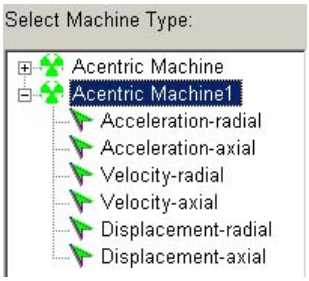


- **Copy and Paste (button):** Copy data of a machine type or a channel type.

1. Select a machine type (or a channel type) from list.

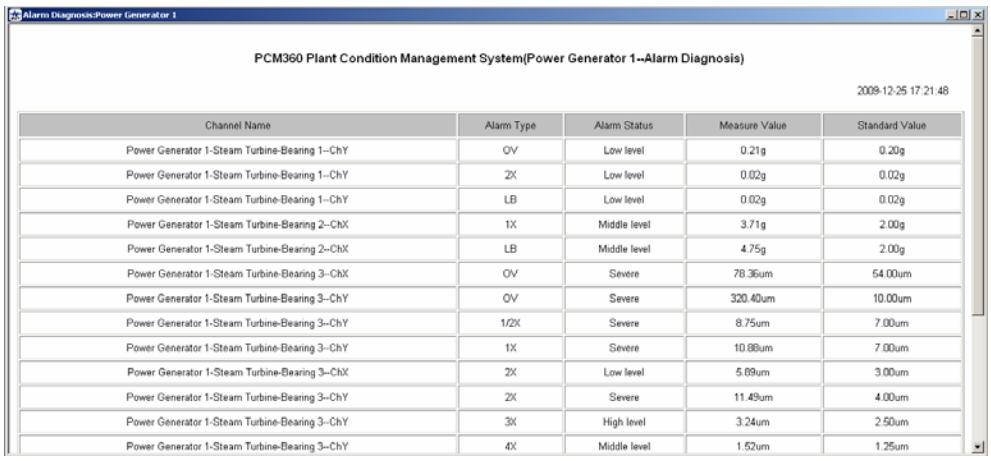


2. Click **Copy** and **Paste** button.



Alarm Diagnosis

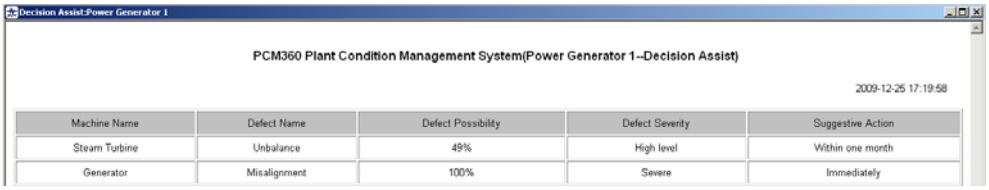
Use this command to display alarm diagnosis list of a machine or a machine train. Select a machine train or a machine from tree view (ensure Display module on local Display Terminal is started), and then Select **Alarm Diagnosis** command from **Decision Support** menu.


Alarm Diagnosis:Power Generator 1
PCM360 Plant Condition Management System(Power Generator 1--Alarm Diagnosis)
2009-12-25 17:21:48

Channel Name	Alarm Type	Alarm Status	Measure Value	Standard Value
Power Generator 1-Steam Turbine-Bearing 1--ChY	OV	Low level	0.21g	0.20g
Power Generator 1-Steam Turbine-Bearing 1--ChY	2X	Low level	0.02g	0.02g
Power Generator 1-Steam Turbine-Bearing 1--ChY	LB	Low level	0.02g	0.02g
Power Generator 1-Steam Turbine-Bearing 2--ChX	1X	Middle level	3.71g	2.00g
Power Generator 1-Steam Turbine-Bearing 2--ChX	LB	Middle level	4.75g	2.00g
Power Generator 1-Steam Turbine-Bearing 3--ChX	OV	Severe	78.36um	54.00um
Power Generator 1-Steam Turbine-Bearing 3--ChY	OV	Severe	320.40um	10.00um
Power Generator 1-Steam Turbine-Bearing 3--ChY	1/2X	Severe	8.75um	7.00um
Power Generator 1-Steam Turbine-Bearing 3--ChY	1X	Severe	10.88um	7.00um
Power Generator 1-Steam Turbine-Bearing 3--ChX	2X	Low level	5.69um	3.00um
Power Generator 1-Steam Turbine-Bearing 3--ChY	2X	Severe	11.49um	4.00um
Power Generator 1-Steam Turbine-Bearing 3--ChY	3X	High level	3.24um	2.50um
Power Generator 1-Steam Turbine-Bearing 3--ChY	4X	Middle level	1.52um	1.25um

Decision Assist

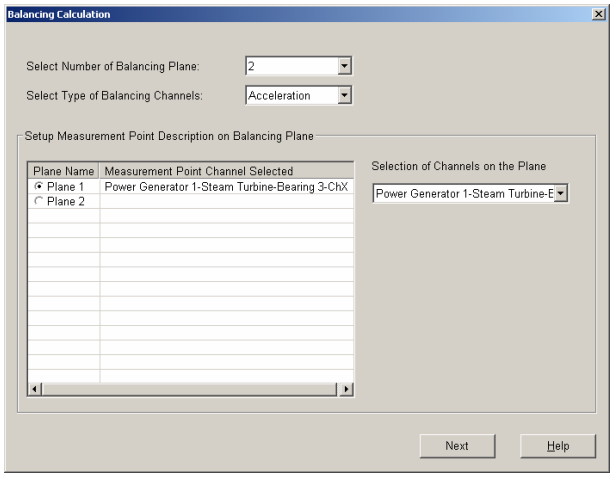
Use this command to view decision assist list of a machine or a machine train. Select a machine train or a machine from tree view (ensure Display module on local Display Terminal is started), and then select **Decision Assist** from **Decision Support** menu.



Balance Menu

Balancing Calculation

Balancing adjusts the radial mass distribution of a rotor so that the mass centerline (principal axis of inertia) approaches or coincides with the rotor geometric centerline. Ensure Display module on local computer is started. Select a machine train (or a machine) in the list; select **Balancing Calculation** command from **Balance** menu.



Select Number Of Balancing Plane: Select the number of planes to be balanced.

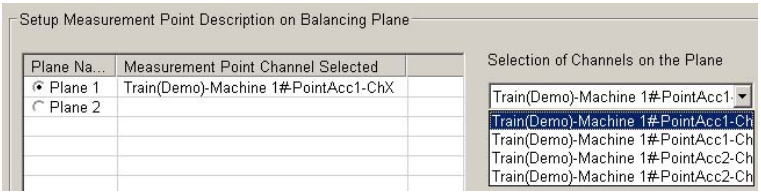
Select Type of Balancing Channels: Select the type of the channels the balanced plane maps.

Selection of Channels on the Plane: Displays measurement point channels with the selected channel type. If select “Acceleration”, all acceleration channels under the selected machine train will be displayed.

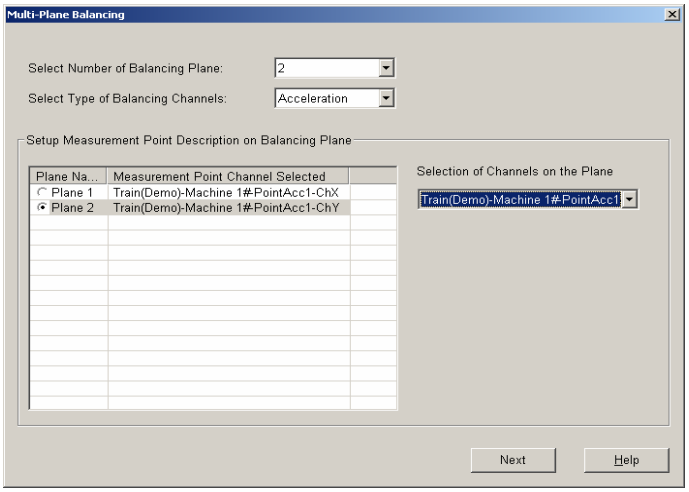
Plane List: First column shows the plane name and second column shows the channel this plane maps.

Planes balancing process is below:

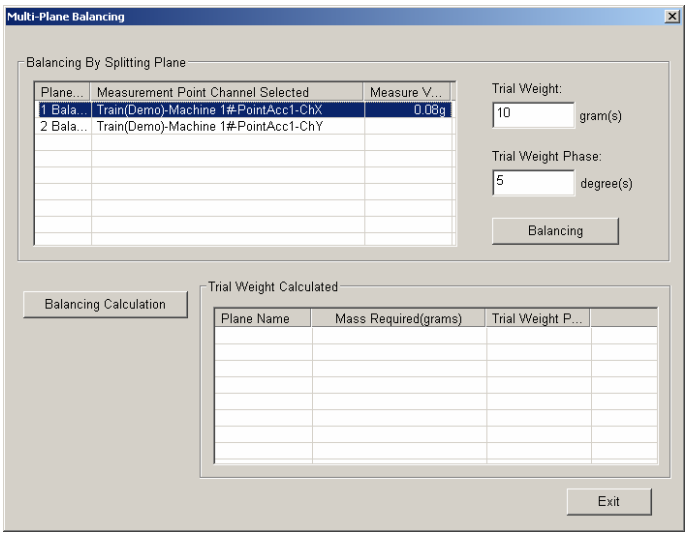
1. Select the plane number.
2. Select the channel type.
3. Select a plane and channel to map.



4. Click **Next** button if all planes are mapped.

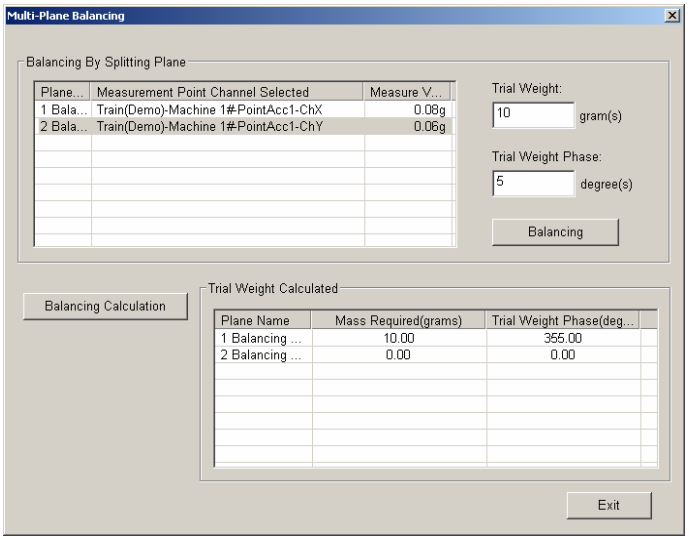


5. In window below, select a plane, type the trial weight and phase, and then click **Balancing** button. Later measure value will be displayed on the list.



6. Repeat step5 until all planes are balanced.

7. Click **Balancing Calculation** button to calculate the required mass and phase.



NOTES:

1. In a plane balancing, all channels should be configured with the same “Channel Type”, “Measurement Unit”, “Sensitivity”, “Measurement Mode” and “Measurement Type”.
2. All channels should map the phase reference channel.

PCM360 Web Service Introduction

PCM360 system with version 3.6 or later provides Web service. The function allows user to log on the PCM360 system via any IE terminal to view historical and real-time plots of the data.

Run Web Server Software

CAUTION: Before run the software, ensure the following:

1. SQL Server is running!
2. The DB Server to be connected is running!

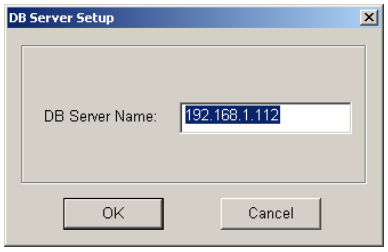
Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**PCM360 Web Server** command to run the software.

After the software was started, the tray icon of the software appears in the taskbar. Right click the tray icon, and then the shortcut menu is launched. See picture below:



Web Server IP Setup: Type the IP address of the Web Server used for internet access. This IP address and characters "PCM360WEB" constitute the website to log on the PCM360 system (website: "**http://IP address of the Web Server/PCM360WEB**").

DB Server Setup: Specify a DB Server to connect to. You are allowed to switch to different DB Servers in the network.



Type the name or the IP address of the DB Server and click **OK** button.

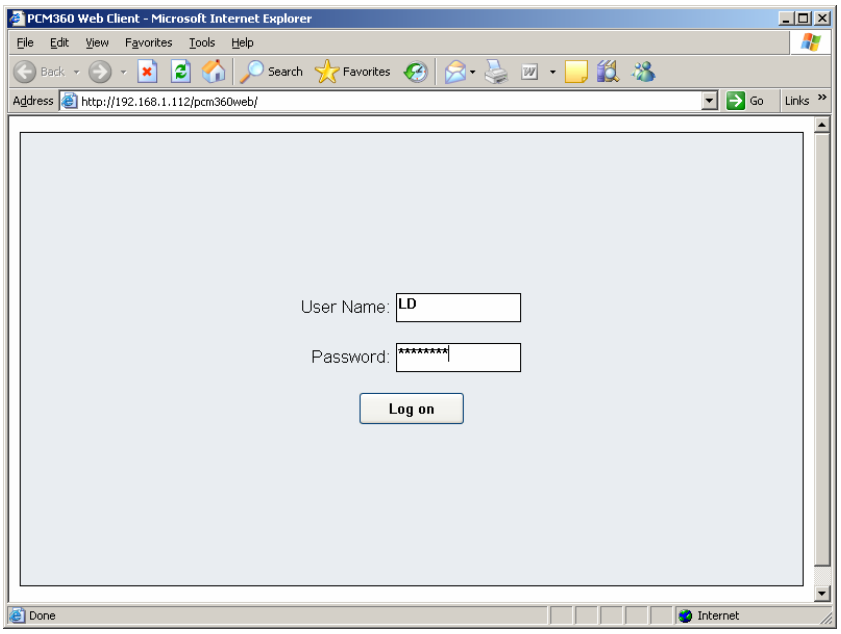
NOTE: Web Server IP address and DB Server name (or IP address) were set when you installed the Web Server software. If the information was not changed, you needn't modify them here.

Exit: Click this command to exit the software.

Log on the System via IE Terminal

CAUTION: Before log on the system, ensure the Web Server software is running.

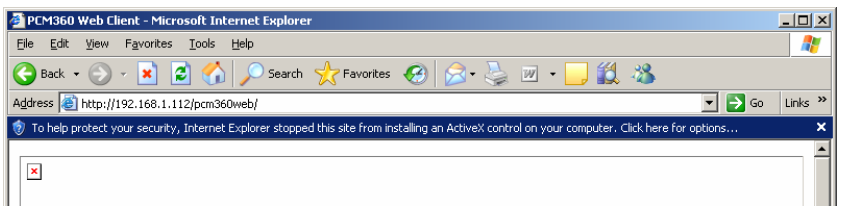
User can log on the system on any IE terminal. Type the correct website in the browser (for example, the IP address of your Web Server is “192.168.1.112”, so the website is “http://192.168.1.112/PCM360WEB”). Then the logon window will be launched. See picture below:



All PCM360 system user accounts could log on the system via IE terminal. Type the available user name and the related password. PCM360 system allows up to 5 users to log on the system at the same time.

Downloading ActiveX Controls

First time to log on the system, you should download “activex360” to your computer to let the IE terminal computer has access to the web server over a network connection. Type the correct website and then an information bar will be launched (near the top of your browser). See picture below:

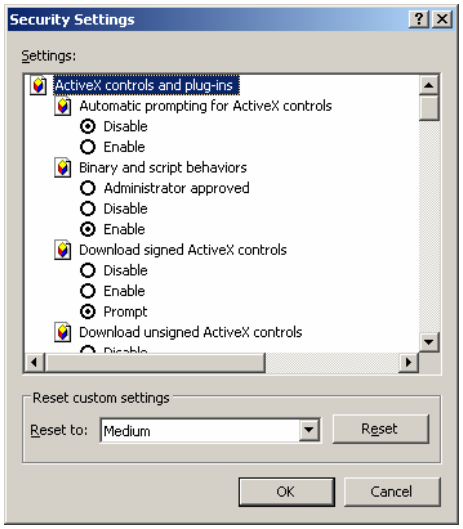

PCM360 Web Client - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://192.168.1.112/pcm360web/
Go Links
To help protect your security, Internet Explorer stopped this site from installing an ActiveX control on your computer. Click here for options...

Click the information bar and select **Install ActiveX Control** command from the pop-up menu. Then a security warning window is launched. Click **Install** button on the window to install the security control.

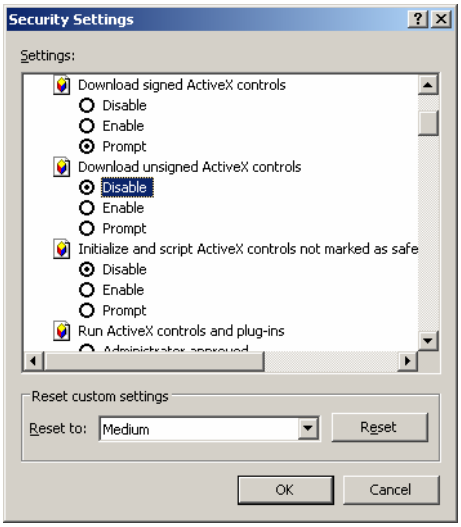
After installed the security controls, the logon window is launched.

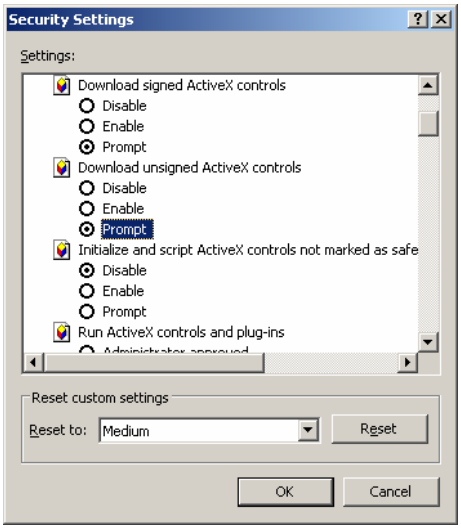
NOTE: If you're forbidden to install the security control, follow steps below to set the internet security settings.

1. Select **Internet Options** command from **Tools** menu on Internet Explorer.
2. On "Internet Options" window, select **Security** tab, and then select "Internet" item and click **Custom Level…** button.
3. On "Security Settings" window, find item "ActiveX controls and plug-ins".



4. Find "Download unsigned ActiveX controls" item and you' see the default setting of this item is "Disable". You should change this setting to "Prompt". See pictures below:





Tree View and Graphics View Introduction

When log on the system, user could view the PCM Explorer information of the current logon user. The PCM Explorer is defined on DAQ or Display module (refer to ***Define PCM Explorer*** of this manual for details).

The PCM Explorer includes two parts: tree view and graphics view.

Tree view lists plants, machine trains, machines, and measurement points information that related to the current logon user. The features are similar to the tree view of PCM Explorer on DAQ module. See ***PCM360 DAQ&COM SOFTWARE OPERATION/View Menu/PCM Explorer/Tree View*** of this manual for details.

Graphics view provides two types of graphics: Static Data list view and Dynamic Data list view. On data list view, samples will be displayed in Details mode by default, and you can right click the graphics view and select the proper mode to view them. In addition, the color of the sample indicates the alarm status.

- ✓ **Red:** Danger.
- ✓ **Yellow:** Alert.
- ✓ **Green:** Normal.

Plots Display

The toolbar lists all shortcut icons of the functions for displaying the plots and alarm list. Note that you could only view one plot or alarm list at a time.

 : Display historical waveform plot.

 : Display historical spectrum plot.

 : Display historical shaft XY vibration plot.

 : Display historical dynamic trend plot.

 : Display historical static trend plot.



: Display alarm events of the selected measurement point, machine or machine train.

 : Display bar graph of the selected measurement point, machine or machine train.

 : Display real-time waveform plot.

 : Display real-time spectrum plot.

 : Display real-time shaft XY vibration plot.



: Display or hide the plot that is generated by data from channel X of a measurement point.



: Display or hide the plot that is generated by data from channel Y of a measurement point.

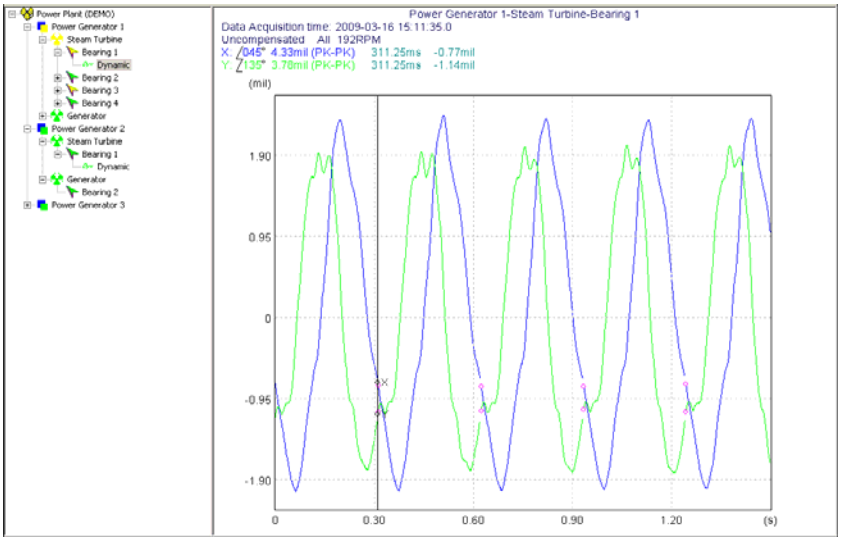
: Auto full scale the plot.

: Zoom in the plot.

: Restore a magnified plot to original size.

Historical Waveform

From graphics view, select a dynamic sample, and then click button on toolbar. Picture below shows a waveform plot with both channel X and channel Y:

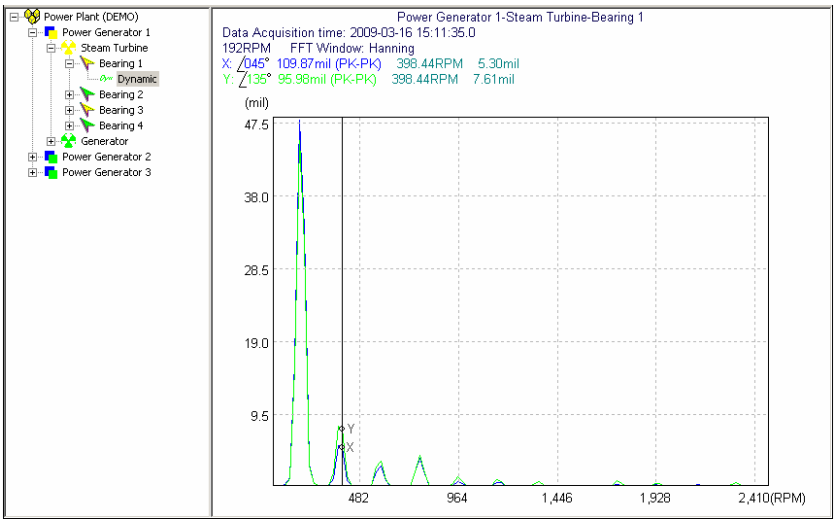


Some features of the waveform viewed on IE terminal are similar to the historical waveform viewed on Display Terminal. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Waveform*** of this manual for details.

NOTE: You can't directly switch to the waveform with other frequency components or compensation properties. If you want to view the plot with different frequency or compensation properties, you should exit the IE terminal and log on Display software to change the parameters (refer to ***Frequency and compensation Setup*** for details).

Historical Spectrum

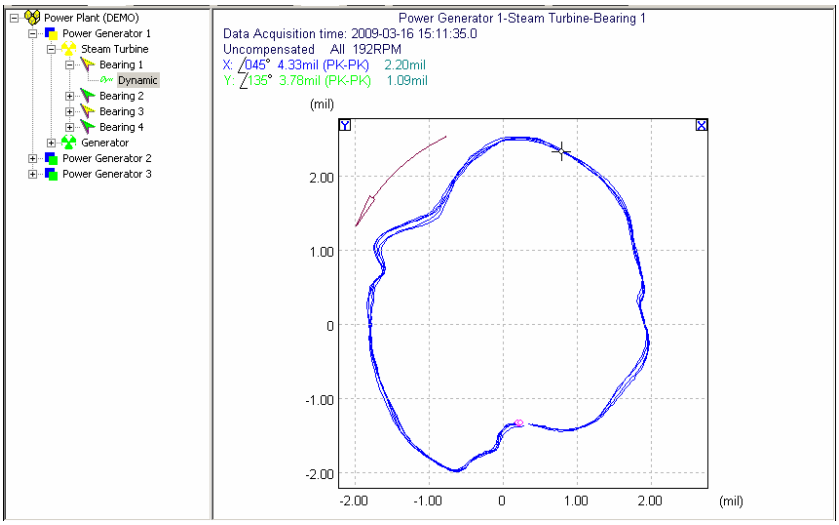
From graphics view, select a dynamic sample, and then click button on toolbar. Picture below shows a spectrum plot with both channel X and channel Y:



Some features of the spectrum you viewed on IE terminal are similar to the historical spectrum viewed on Display Terminal. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Spectrum*** of this manual for details.

Historical Shaft XY Vibration

Shaft XY vibration is two dimensional path of the shaft centerline motion perpendicular to the rotor axis during precession. From graphics view, select an available dynamic sample, and then click  button on toolbar. Picture below shows a Shaft XY Vibration plot:

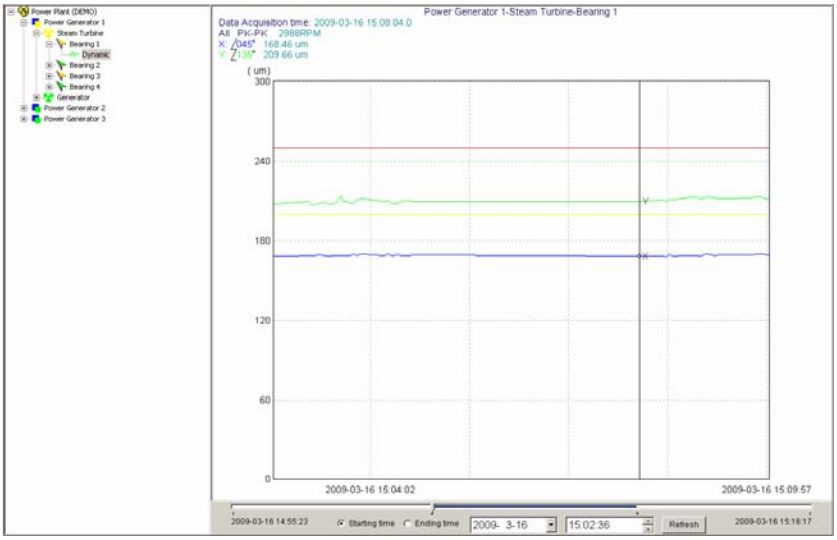


Some features of the shaft XY vibration you viewed on IE terminal are similar to the historical shaft XY vibration viewed on Display Terminal. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Shaft XY Vibration*** of this manual for details.

NOTE: You can't directly switch to the shaft XY vibration with other frequency components or compensation properties. If you want to view the plot with different frequency or compensation properties, you should exit the IE terminal and log on Display software to change the parameters (refer to ***Frequency and compensation Setup*** for details).

Historical Dynamic Trend

Dynamic trend plot is a presentation in Cartesian coordinates of a measured variable versus time, based on all dynamic samples under a measurement point taken over different times. From tree view, select Dynamic symbol beneath the measurement point, and then click  button on toolbar. Picture below shows a dynamic trend plot with both channel X and channel Y:



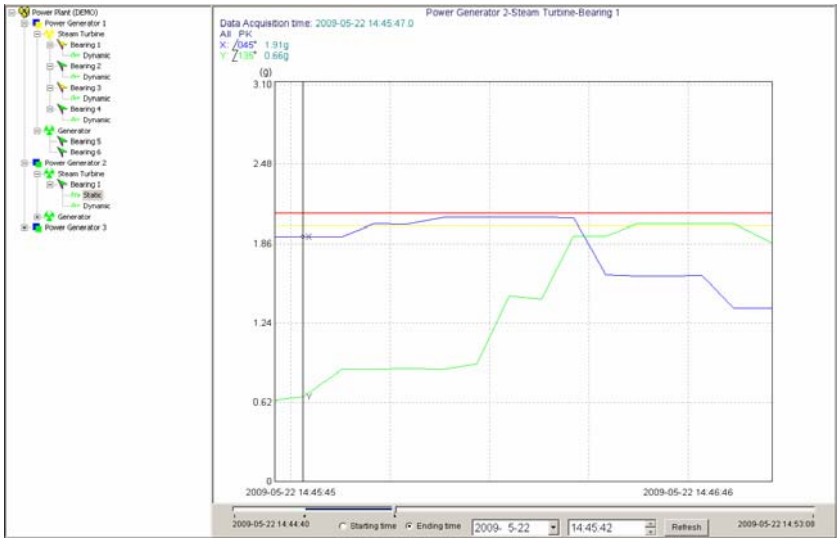
Some features of the dynamic trend you viewed on IE terminal are similar to the historical dynamic trend viewed on Display Terminal. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Trend (Dyn)*** of this manual for details.

NOTE: You can't directly switch to the dynamic trend with other frequency components. If you want to view the plot with different frequency, you should exit the IE terminal and log on Display software to change the parameters (refer to ***Frequency and compensation Setup*** for details).

Historical Static Trend

Static trend plot is a presentation in Cartesian coordinates of a measured variable versus time, based on static samples under a measurement point taken over different times. From tree view, select Static symbol beneath

the measurement point, and then click button on toolbar. Picture below shows a static trend plot with both channel X and channel Y:



Some features of the static trend you viewed on IE terminal are similar to the historical static trend viewed on Display Terminal. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Trend (Sta)*** of this manual for details.

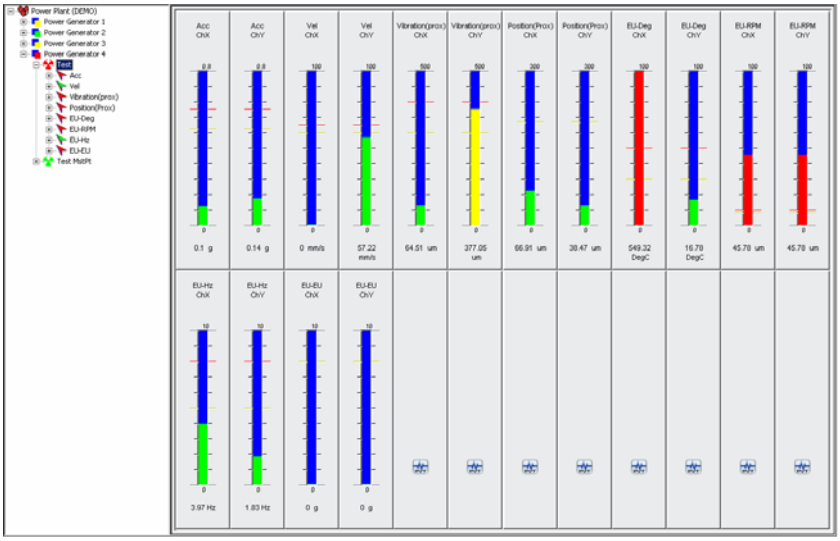
Alarm List

Alarm list shows the information concerning the alarm events of the machine train, machine, and measurement point. From tree view, select the machine train (machine, or measurement point), and then click ALM button on toolbar. On the launched “Time Range” window, select the time range of the alarm events you want to view and then click **OK** button.

Some features are similar to the alarm list viewed on Display Terminal. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Alarm List*** of this manual for details.

Bar Graph

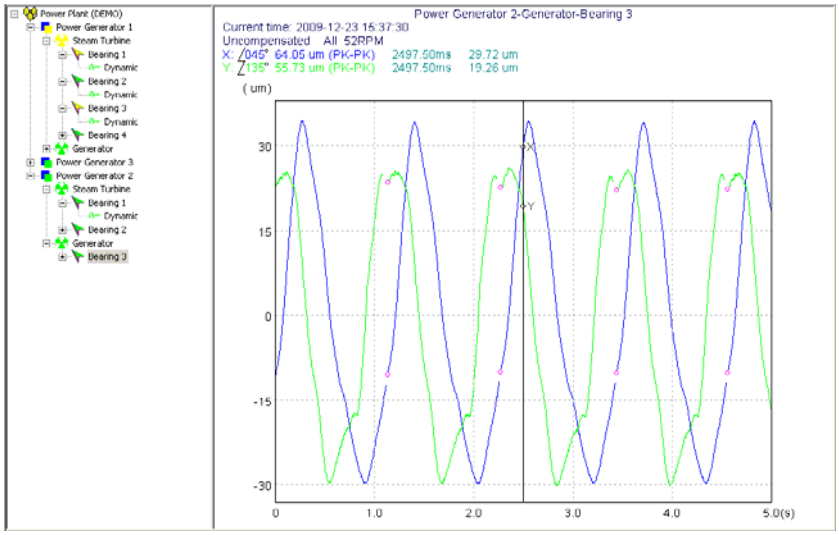
Bar graphs are a popular format for displaying current measured value and status of channels. Ensure DAQ module is started. Select a node from tree view (the node could be a machine train, a machine, or a measurement point). Then directly click on toolbar. Picture below shows a bar graph of a measurement point.



The features are similar to the bar graph viewed on Display Terminal. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Bar Graph*** of this manual for details.

Real-time Waveform

Ensure DAQ module is started. From tree view, select a measurement point, and then click  button on toolbar.



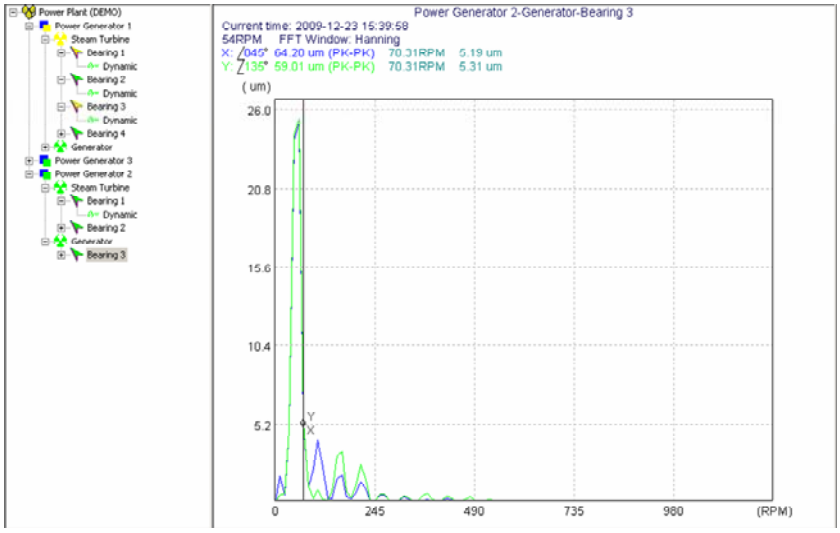
The functions for historical waveform also apply to real-time waveform. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Waveform*** for details.

NOTE: You can't directly switch to the real-time waveform with other frequency components or compensation properties. If you want to view the plot with different frequency or compensation properties, you should exit the IE terminal and log on Display software to change the parameters (refer to ***Frequency and compensation***

Setup for details).

Real-time Spectrum

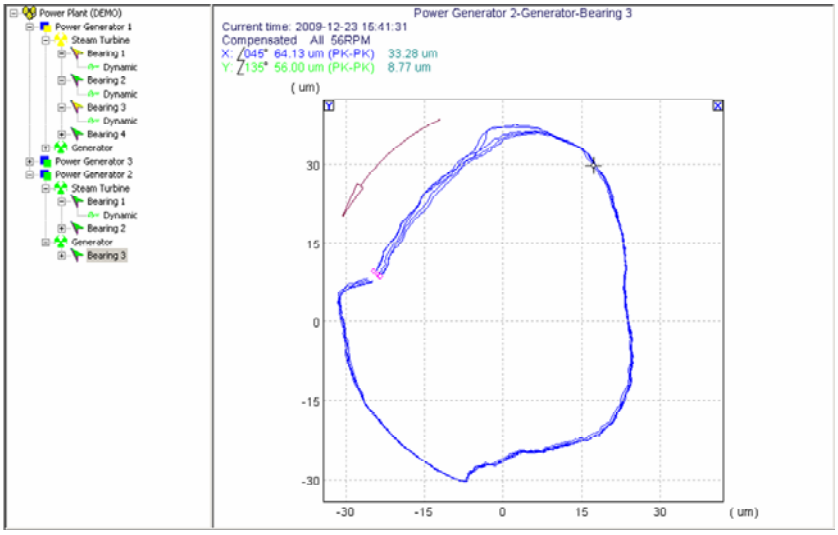
Ensure DAQ module is started. From tree view, select a measurement point, and then click button on toolbar.



The functions for historical spectrum also apply to real-time spectrum. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Spectrum*** for details.

Real-time Shaft XY Vibration

Ensure DAQ module is started. From tree view, select a measurement point, and then click button on toolbar.



The functions for historical shaft XY vibration also apply to real-time shaft XY vibration. See ***PCM360 DISPLAY SOFTWARE OPERATION/Plots Menu/Shaft XY Vibration*** for details.

NOTE: You can't directly switch to the real-time shaft XY vibration with other frequency components or compensation properties. If you want to view the plot with different frequency or compensation properties, you should exit the IE terminal and log on Display software to change the parameters (refer to ***Frequency and compensation Setup*** for details).

PCM360 DBM Software Operation

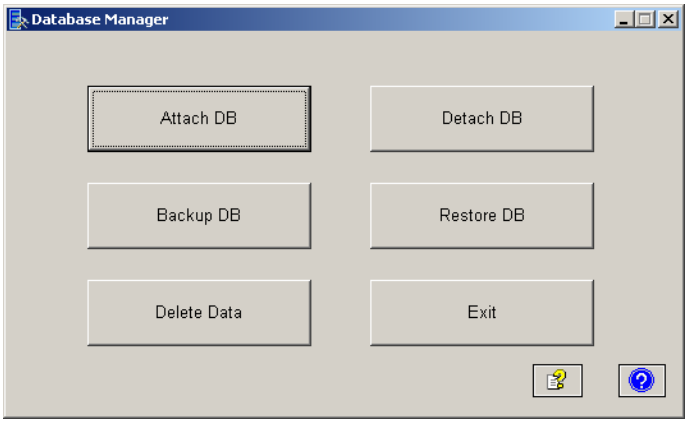
DBM software is used to manage and maintain the database of PCM360 system. With this software, user can attach database to SQL Server, backup database to avoid data loss and damage, restore database with a backup record to repair the corrupt database (or review the former data and configuration), and delete the unconcerned data of current database. Note that only administrator has access to operate DBM software.

Run DBM Software

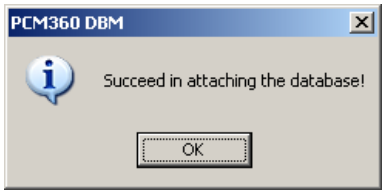
CAUTION: Before you run DBM software, ensure both "SQL Server" service and "SQL Server Agent" service are started.

Select Windows **Start**->**All Programs**->**PCM360 Plant Condition Management System**->**PCM360 DBM** command to run the software.

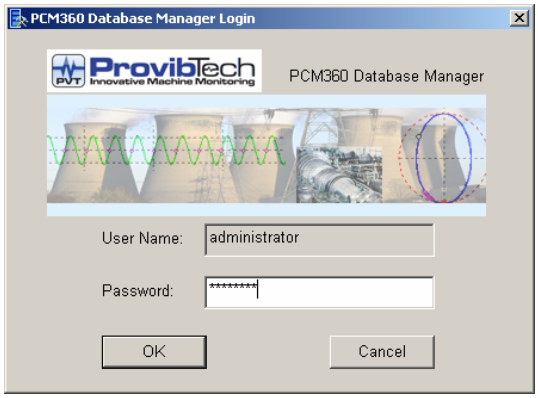
When you first run DBM software, "Database Manager" window will be launched.



You should attach the PCM360 database to SQL Server; otherwise you can't license the PCM360 system. Click **Attach DB** button, if the software succeed in attaching database, it will launch a message box below:



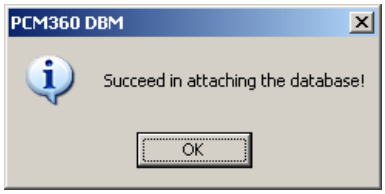
Then you should license your PCM360 system. After license the system, when you run DBM software, "PCM360 Database Manager Login" window will be launched:



Type the password of administrator (the default is “password”), and click **OK** button to logon.

Attach the Database to SQL Server

Click **Attach DB** button to attach the PCM360 database to SQL Server. If DBM software succeeded in attaching the PCM360 database, message box below is launched.



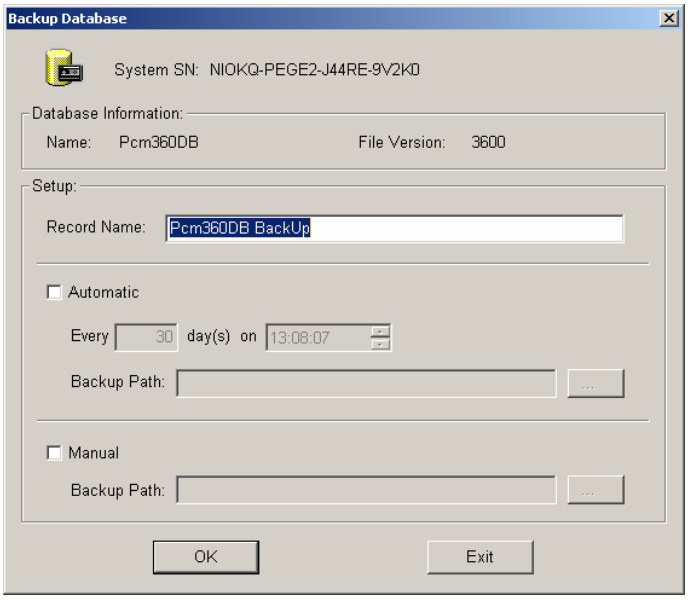
NOTES:

1. Before attach PCM360 database, you cannot operate the database by the software.
2. After attach the database, you should license the PCM360 system, or else you cannot operate the database except detaching it.

Backup Database

Backing up a database produces a copy of data and system configuration. This copy allows you to quickly restore corrupt database resulting from unpredictable problems. We recommend that you backup your PCM360 database periodically to guard against any accidental loss.

Click **Backup DB** button on main window. Then following window is launched.



On “Backup Database” window, the SN of the system, name and DB file version information of the current database are displayed. And also, you can name your backup record of the database in “Record Name” edit box. The name can be up to 31 characters long and will be displayed on restoring list when restore the database.

In PCM360 system, the database could be backed up by two modes: automatic mode and manual mode. And the final output of a backed up database is a single *.BAK file that you can copy and move like any other computer file type.

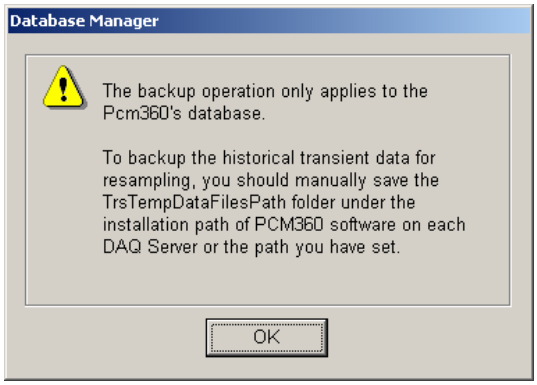
Automatic Backup

If the database is SQL Server Express, this function is disabled.

Automatic: In automatic mode, when the backup interval, time and path are set, DBM software will automatically backup the database at the time and save the backup record with the name you set in “Record Name”.

- **Time setting:** By default, the backup interval is set to “30 days” and backup time is set to current time. You can change default settings as your needs.
- **Backup Path:** Click … button to specify a file as the backup file. When DBM software first backs up PCM360 database by automatic mode, the backup file will be created in the “Back” folder beneath the destination folder of PCM360 system.

To apply the automatic backup, click **OK** button on “Backup Database” window, and then a prompt dialog box will be launched. Pay attention to the contents mentioned on it.


Database Manager
The backup operation only applies to the Pcm360's database.
To backup the historical transient data for resampling, you should manually save the TrsTempDataFilesPath folder under the installation path of PCM360 software on each DAQ Server or the path you have set.
OK

Click **OK** button to complete the operation.

Manual Backup

Manual: In manual mode, you should first click ... to select a backup path and then click **OK** button on “Backup Database” window. Software will launch the prompt dialog box shown below.

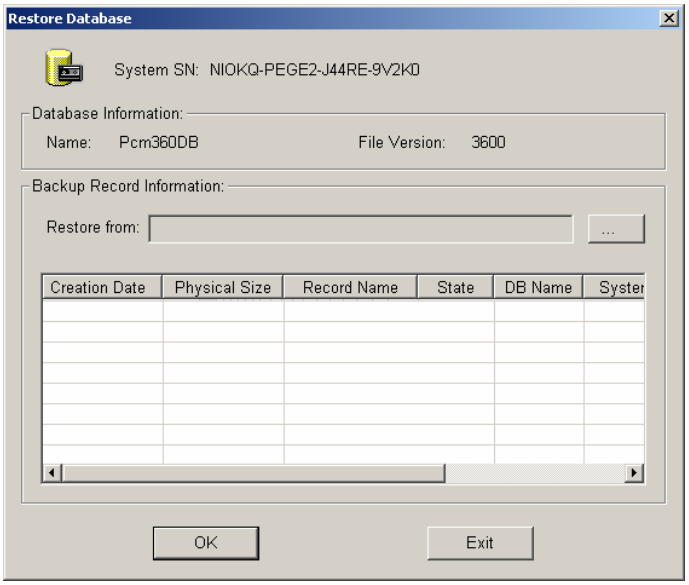

Database Manager
The backup operation only applies to the Pcm360's database.
To backup the historical transient data for resampling, you should manually save the TrsTempDataFilesPath folder under the installation path of PCM360 software on each DAQ Server or the path you have set.
OK

Click **OK** button to complete the operation. If succeeded in backing up the database, the backup file will be saved in the path you set.

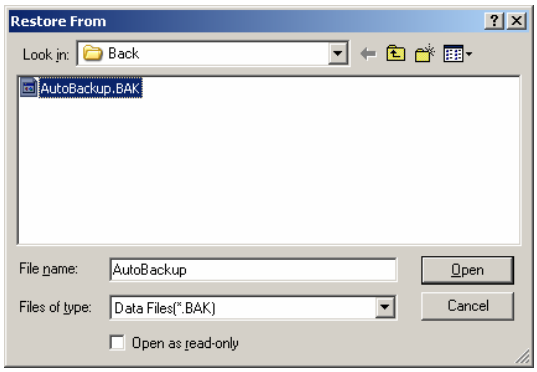
Restore Database

CAUTION: Before restore the database, you must exit DAQ&COM software, Display software, Server software, and Web server software.

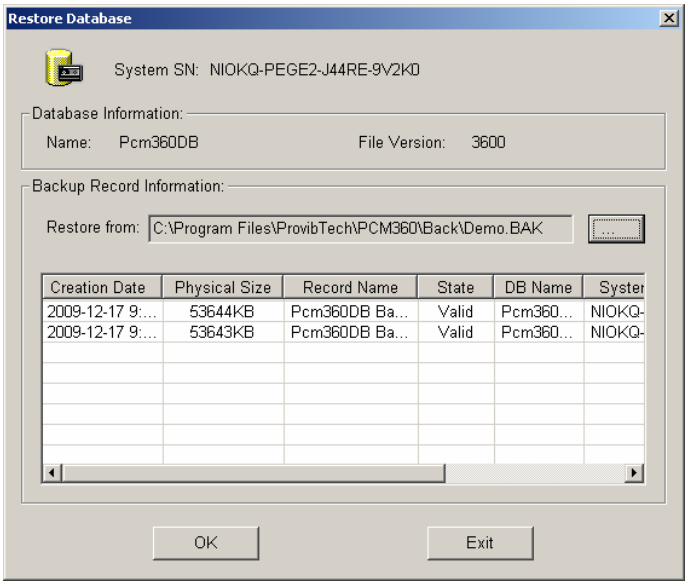
Click **Restore DB** button on the main window. Then following window is launched.



Click  button to select the backup file from which the database to be restored and software will automatically analyze the file you selected.



If the file is valid, information about the backup sets will be displayed:

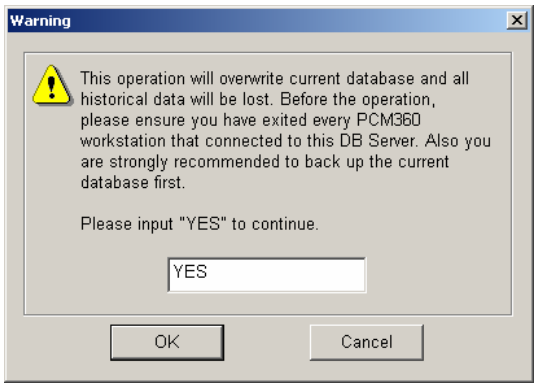


- ✓ **Creation Date:** The time when the backup record is created.
- ✓ **Physical Size:** The physical size of the backup record, which is measured by KB.
- ✓ **Record Name:** The name of the record that is assigned in “Record Name” edit box on “Backup Database” window.
- ✓ **State:** “Valid” and “Invalid” are used to describe the file’s state. Note that user is only allowed to restore database with the valid record. Table below indicates the description associated with the invalid code.

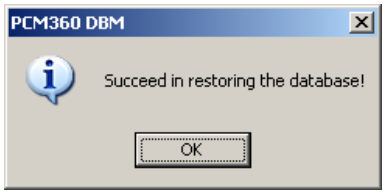
Invalid Code	Description
01	The current backup record is created by the MS SQL Server with a higher version than current MS SQL Server.
02	The type of the backup record is not “Database”.
03	Database was damaged when backed up, but the backup operation was requested to continue despite errors.
04	The backup set is compressed using software-based compression.

- ✓ **DB Name:** The name of the database from which the record was backed up.
- ✓ **System SN:** Serial No. of the system to which the backup record belongs. If the SN doesn’t match your current PCM360 system, a message box will be launched to inform you. We recommend that you restore the database with the record marked the same SN.
- ✓ **DB File Version:** DB file version of the database that produced the backup record. Note that you are forbidden to restore the database with a higher version record.
- ✓ **Position:** The position No. of the backup record in the file.

Select a valid backup record from the list and then click **OK** button. “Warning” window is launched.

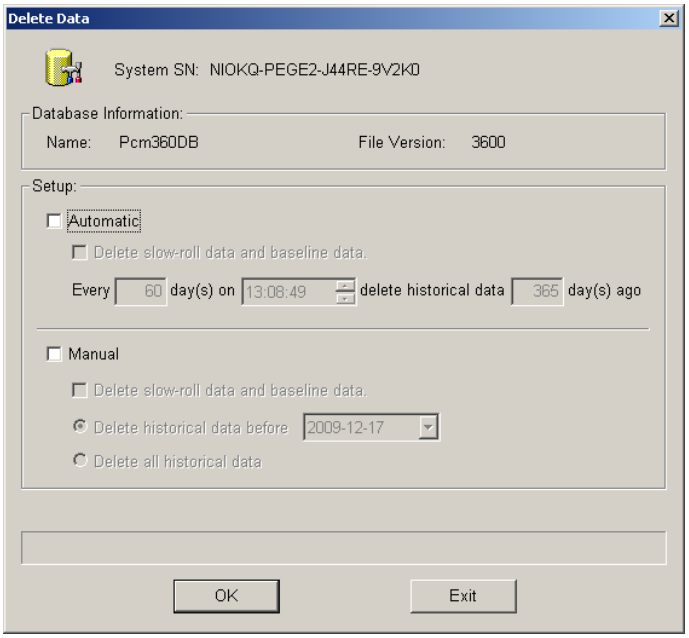

Warning
This operation will overwrite current database and all historical data will be lost. Before the operation, please ensure you have exited every PCM360 workstation that connected to this DB Server. Also you are strongly recommended to back up the current database first.
Please input "YES" to continue.
YES
OK
Cancel

To confirm restore the database, type “YES” and click **OK** button. If succeeded, following message box will be launched.



Delete Historical Data

Click **Delete Data** button on the main window.



On “Delete Data” window, the SN of the system, name and DB file version information of the current database are displayed.

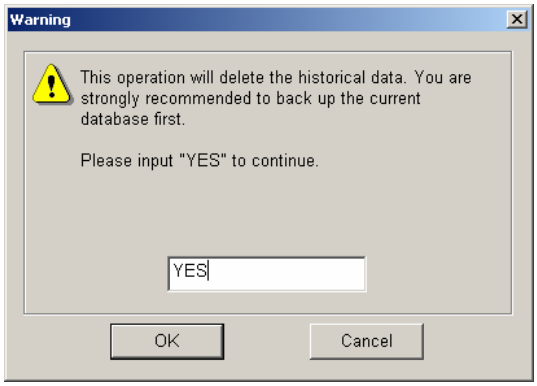
Automatic Data Deleting

If the database is SQL Sever Express, this function is disabled.

Automatic:

- **Delete slow-roll data and baseline data:** If checked, all slow-roll data and baseline data will be removed from the database.
- **Time setting:** Software will give the default time setting: delete historical data collected 365 days ago every 60 days. You can change the time variables as your needs.

To apply automatic data deleting setting, click **OK** button on the window. A “Warning” window is launched.

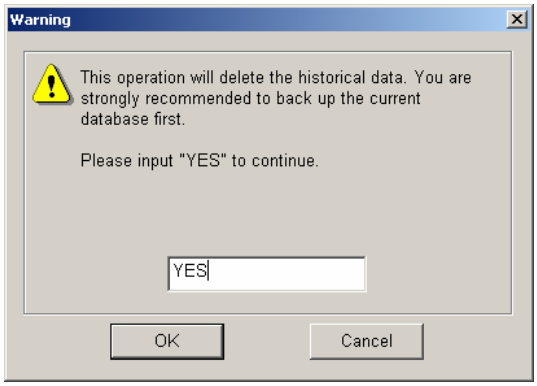

Warning
This operation will delete the historical data. You are strongly recommended to back up the current database first.
Please input "YES" to continue.
YES
OK
Cancel

To confirm the operation, type “YES” and then click **OK** button.

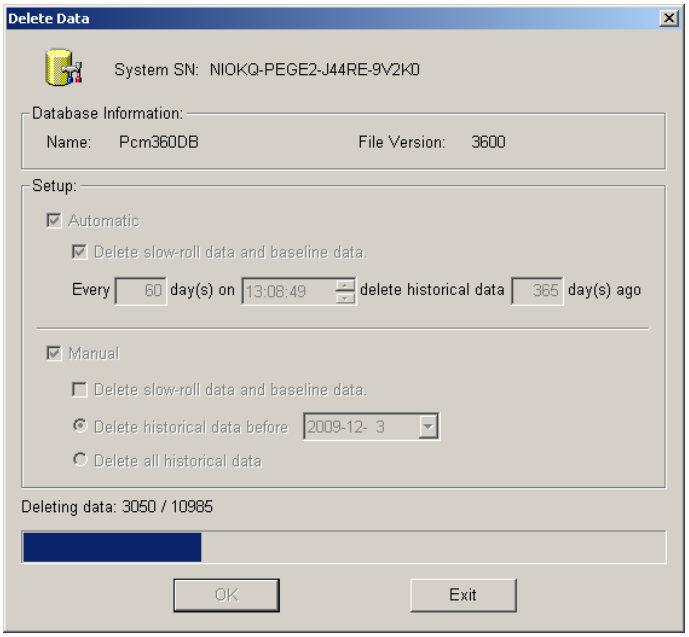
Manual Data Deleting

Manual: If selected, software will check the option “Delete historical data before” and set current day as the time variable by default (you are allowed to modify this setting). Moreover, when select this option, you can decide that whether delete slow-roll and baseline data in the database. If select “Delete all historical data”, all data including the slow-roll and baseline data will be deleted.

Select a deleting option and then click **OK** button on the “Delete Data” window. A “Warning” window is launched.


Warning
This operation will delete the historical data. You are strongly recommended to back up the current database first.
Please input "YES" to continue.
YES
OK
Cancel

To confirm the operation, type “YES” and click **OK** button. Then the software starts to delete the historical data.

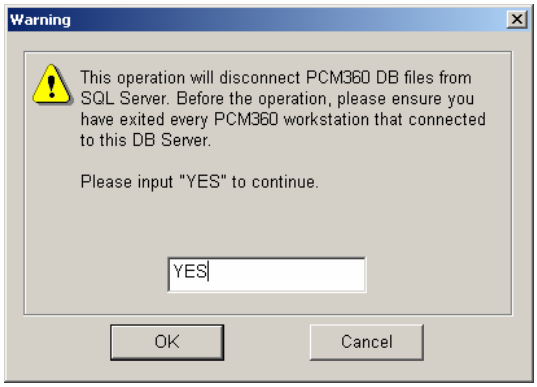


If the current database is already empty or the data you want to delete doesn't exist, software will launch a message box to inform you.

Detach Database

CAUTION: Before the operation, ensure you have exited PCM360 software (DAQ&COM software, Display software, Server software, and Web Server software).

Click **Detach DB** button on the main window to detach current database from SQL Server, and then "Warning" window is launched.

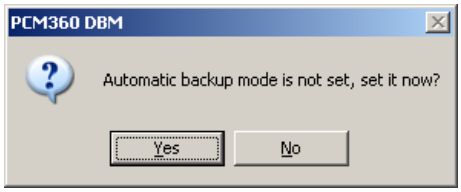

Warning
This operation will disconnect PCM360 DB files from SQL Server. Before the operation, please ensure you have exited every PCM360 workstation that connected to this DB Server.
Please input "YES" to continue.
YES
OK
Cancel

To confirm the detaching operation, type "YES" and then click **OK** button.

Exit PCM360 DBM Software

Click **Exit** button or close button on main window to exit the software.

If you haven't set the automatic backup mode, when exit the software, a message box is launched to inform you. See picture below:



We recommend you backup your database periodically. On window above, click **Yes** button to set it.

If you have already set it, when exit the software, following message box is launched. Click **Yes** button to exit the software.



PCM360 Server Software Operation

PCM360 Server software is used to manage all PCM360 services such as OPC service, Modbus TCP service, SMS, and Text Output service.

Run PCM360 Server Software

CAUTION: After licensed the PCM360 system, you should run the PCM360 Server software.

Select Windows **Start**->**All programs**->**PCM360 Plant Condition Management System**->**PCM360 Server** to run the software.

NOTE: To make your system work normally, you **must** keep Server software running, since the software periodically detects the softdog hardware plugged on the DB Server.

PCM360 Server Tray

PCM360 Server software is a taskbar application and follows the standard behavior of taskbar applications. When the software is minimized, its tray icon appears in the area of the taskbar clock on the right of the taskbar.

Three Statuses of Tray Icon

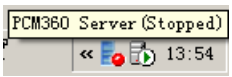
1. No services that reside on your DB Server.



2. All services that reside on your DB Server are running.

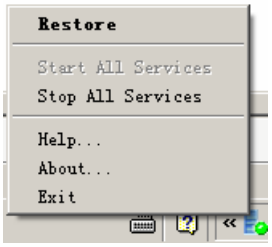


3. All services that reside on your DB Server are stopped.



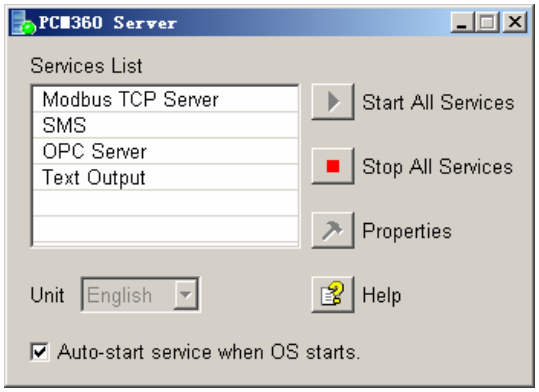
Shortcut Menu Introduction

Right click the tray icon of PCM360 Server software to launch the shortcut menu:



Restore:

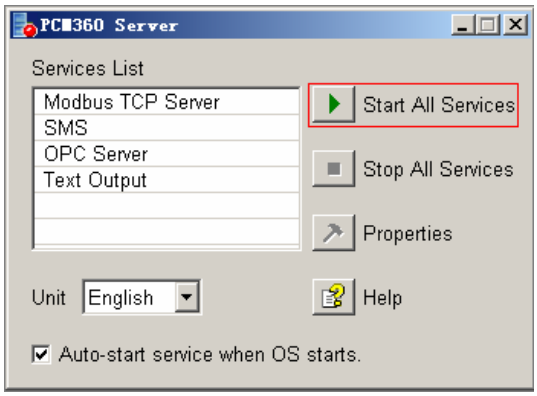
Click this command to normally display the main window of PCM360 Server software.



As an alternative to this operation, you can double click the shortcut icon.

Start All Services:

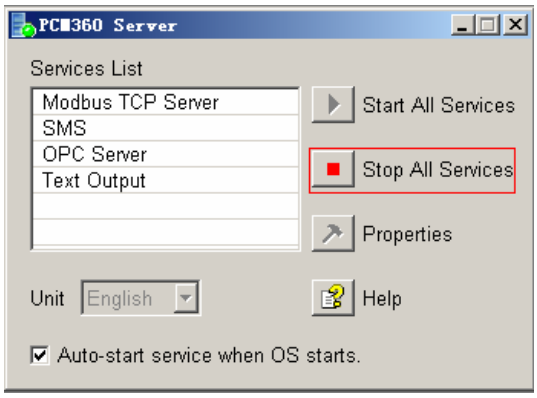
Click this command to start all services. It has the same function with **Start All Services** button on main window.



When the services are running, this command and the related **Start All Services** button on main window will turn gray.

Stop All Services:

Click this command to stop all services. It has the same function with **Stop All Services** button on main window.



When services are stopped, this command and the related **Stop All Services** button on main window will turn gray.

Help:

Click this command to see help file of PCM360 Server software. It has the same function with **Help** button on main window.

About:

Click this command to see information such as the version, copyright, build serial number of the current PCM360 Server software.

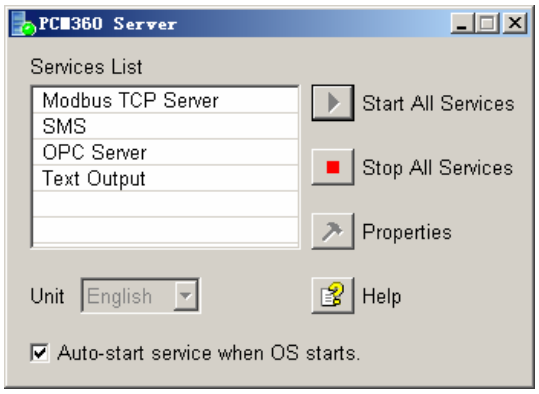
Exit:

Click this command to exit PCM360 Server software.

NOTES:

1. To apply the services, ensure the services have been started.
2. Clicking the close button on the main window won't exit the software but only minimize it to taskbar.

Main Window Introduction



The status of the main window indicates the status of the services (stopped or running). For detailed information, please go to ***PCM360 SERVICES***.

Services List

Display all services that reside on the DB Server.

Start All Services (Button)

Click this button to start all services. It has the same function with **Start All Services** command on shortcut menu.

Stop All Services (Button)

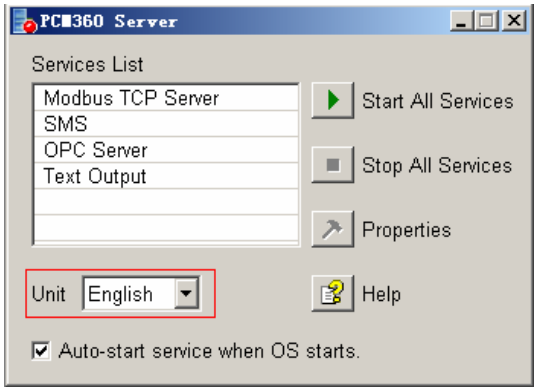
Click this button to stop all services. It has the same function with **Stop All Services** command on shortcut menu.

Help (Button)

Click this button to see help file of PCM360 Server software. It has the same function with **Help** command on shortcut menu.

Unit Selection

This function is used to specify the display format of units for the data that is to be distributed by PCM360 services.



On “PCM360 Server” window, stop all services and select a unit from “Unit” combo box, and then start all services.

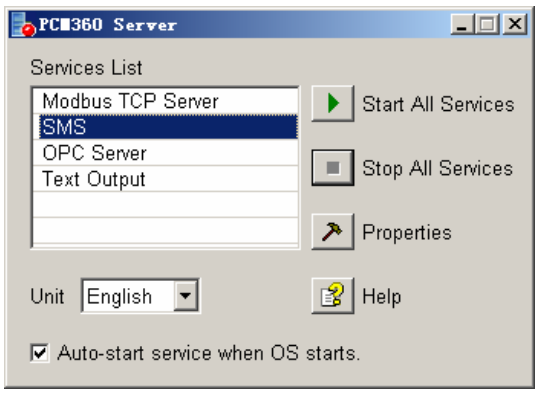
Auto-start service when OS starts

If checked, all services will be automatically started when the operating system starts.

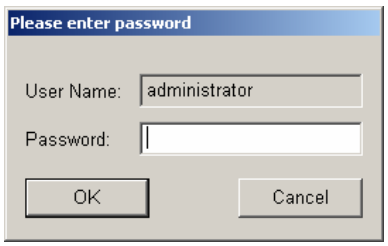
Properties (Button)

Click this button to set properties of the selected service. Note that only PCM360 administrator has access to set service’s property.

Ensure all services are stopped. Select the service from “Services List”, for example, select “SMS”.



Click **Property** button, and a message box below is launched.



Type the logon password of PCM360 administrator and click **OK** button. Then the “SMS Setting” window is launched.

For more details about four services (OPC service, Modbus TCP service, SMS, and Text Output), please go to the related chapter of this manual.

PCM360 Services

Currently, PCM360 system provides four services: OPC service, Modbus TCP service, SMS, and Text Output service. In this chapter, we will detailedly introduce the configuration and application of each service.

PCM360 OPC Server

As an OPC Server, PCM360 system could transfer real-time measured value and alarm status information to the third-party OPC Client.

OPC and DCOM Settings

OPC technology provides an interoperable, reliable and secure communication platform. However, OPC relies on a properly configured DCOM infrastructure. This includes setting Windows security and firewalls, access control lists, server identities, etc. OPC may not always work as expected if it is not properly configured. But usually it is frustrating for new user to configure DCOM properly. The section will guide you step by step to help you successfully establish an OPC connection and transfer OPC data.

In this example, PCM360 system is used as OPC Server to distribute data to the third-party OPC Client. Table below indicates the Windows logon accounts for PCM360 OPC Server and third-party OPC Client.

	PCM360 OPC Server	**Third-party OPC Client**
Operating System	Windows XP SP2	Windows XP SP2
Windows Logon Account	**User Name:** Administrator **Password:** password	**User Name:** OPCUser **Password:** 1234

Besides, the two computers are located in the same Windows workgroup.

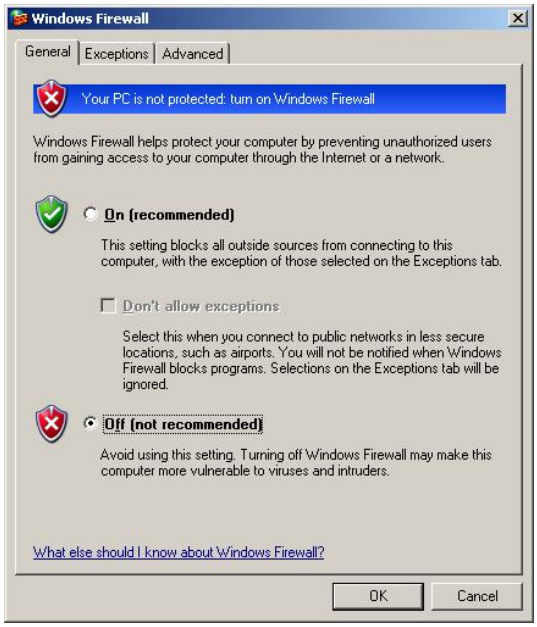
Configure OPC Server

CAUTION: Before configuring OPC Server, please ensure the OPC Server has been registered. In PCM360 system, it was registered automatically when user installed the PCM360 OPC Server software.

Follow steps below to configure OPC Server:

1. Remove Windows Security

Turn off the Windows Firewall: Click the Windows **Start** menu and select **Control Panel**, and then click **Windows Firewall** command. In the **General** tab, select the **"Off (not recommended)"** radio button.


Windows Firewall
General
Exceptions
Advanced
Your PC is not protected: turn on Windows Firewall
Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
On (recommended)
This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Don't allow exceptions
Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
Off (not recommended)
Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
What else should I know about Windows Firewall?
OK
Cancel

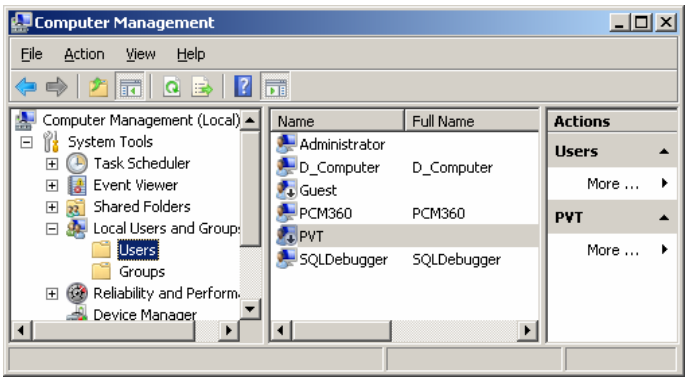
2. Set mutual User Account recognition

To enable both OPC Server and Client to properly recognize User Accounts, it is necessary to ensure that User Accounts are recognized on both of them. This includes all the User Accounts that will require OPC access.

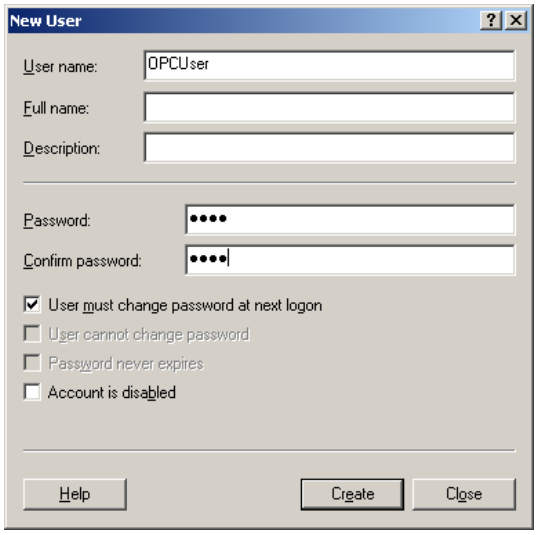
a. Adding User Account

Ensure logon user name and password are matched those on third-party OPC Client. Add a new user called "OPCUser" on PCM360 OPC Server and set the password of this user to "1234".

a) Right click **My Computer**, and then select **Manage** command to launch "Computer Management" window.

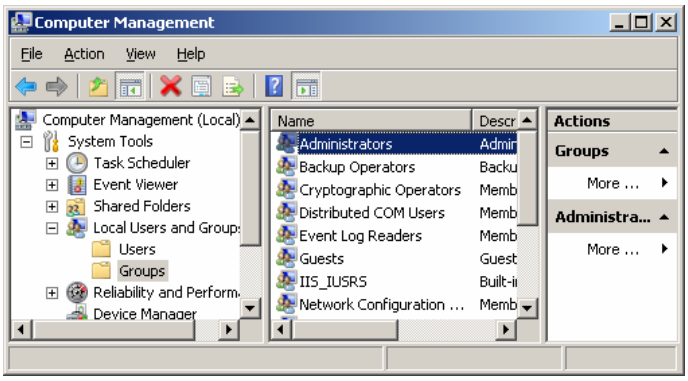


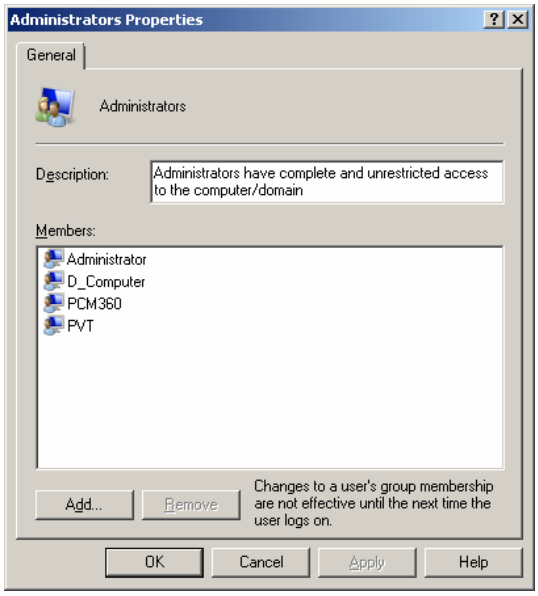
b) Select **Computer Management (Local)**->**System Tools**->**Local Users and Groups**. Right click **Users** and select **New User…** command.



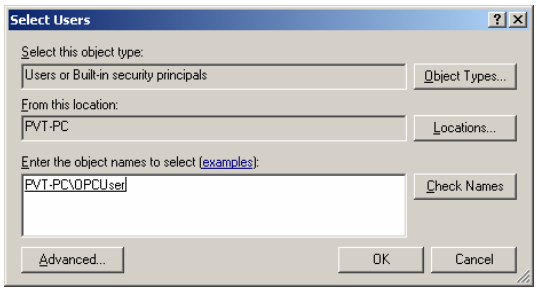
On “New User” window, type the user name (OPCUser) of the OPC Client and password (1234), and then click **Create** button.

c) Select **Computer Management (Local)**->**System Tools**->**Local Users and Groups**->**Groups**. Double click “Administrators” item.



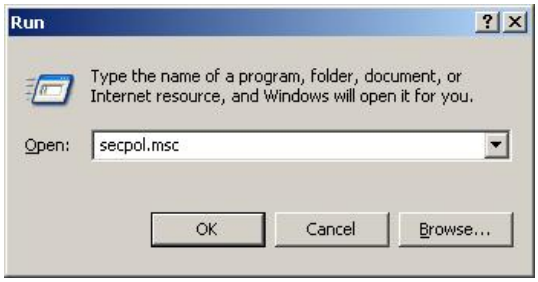


d) On “Administrators Properties” window, click **Add** button and type “OPCUser” to add “OPCUser” user account to “Administrators” group; or you can click **Advanced** button and then find “OPCUser” from the use list and then add it to “Administrators” group. Then click **OK** button.

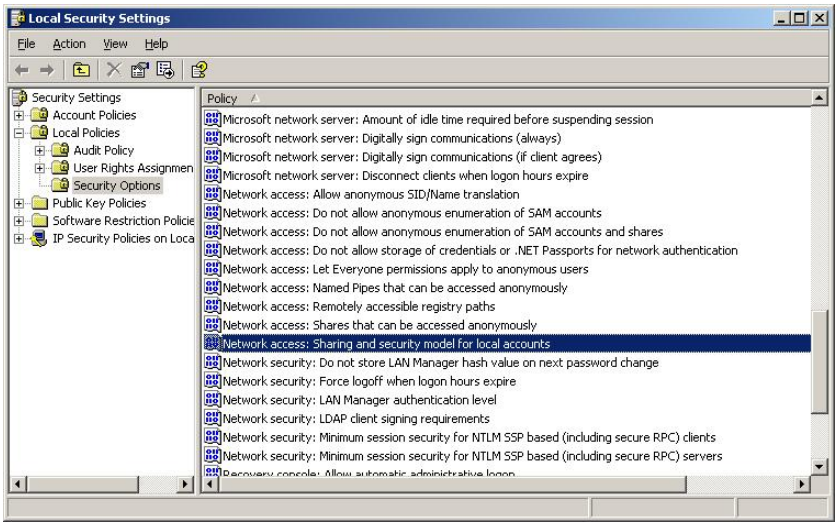


b. Set Local Security Policies

a) Click Windows **Start** menu and select the **Run** command, then type "**secpol.msc**" in the edit box.



b) On "Local Security Settings" window, navigate to **Security Settings**->**Local Policies**->**Security Options** folder from tree view.

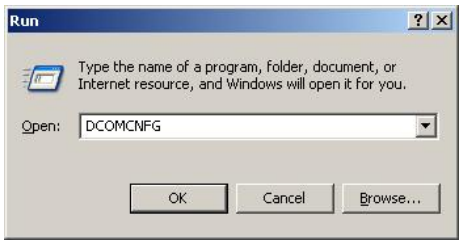

Local Security Settings
File Action View Help
Security Settings
Account Policies
Local Policies
Audit Policy
User Rights Assignmen
Security Options
Public Key Policies
Software Restriction Policie
IP Security Policies on Loca
Policy
Microsoft network server: Amount of idle time required before suspending session
Microsoft network server: Digitally sign communications (always)
Microsoft network server: Digitally sign communications (if client agrees)
Microsoft network server: Disconnect clients when logon hours expire
Network access: Allow anonymous SID/Name translation
Network access: Do not allow anonymous enumeration of SAM accounts
Network access: Do not allow anonymous enumeration of SAM accounts and shares
Network access: Do not allow storage of credentials or .NET Passports for network authentication
Network access: Let Everyone permissions apply to anonymous users
Network access: Named Pipes that can be accessed anonymously
Network access: Remotely accessible registry paths
Network access: Shares that can be accessed anonymously
Network access: Sharing and security model for local accounts
Network security: Do not store LAN Manager hash value on next password change
Network security: Force logoff when logon hours expire
Network security: LAN Manager authentication level
Network security: LDAP client signing requirements
Network security: Minimum session security for NTLM SSP based (including secure RPC) clients
Network security: Minimum session security for NTLM SSP based (including secure RPC) servers

Find the **"Network access: Sharing and security model for local accounts"** item and set it to **"Classic – local users authenticate as themselves"**.

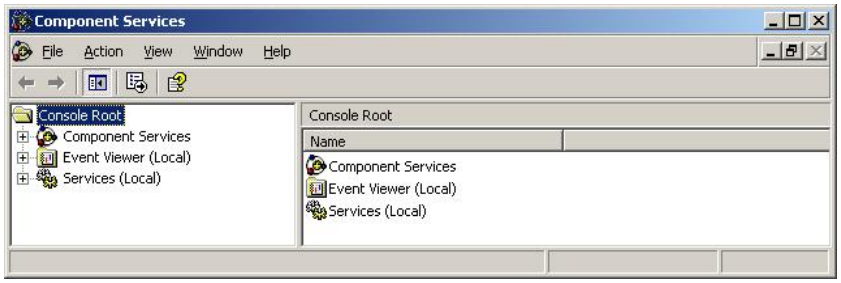

Network access: Sharing and security model for local accounts...
Local Security Setting
Network access: Sharing and security model for local accounts
Classic - local users authenticate as themselves
Classic - local users authenticate as themselves
Guest only - local users authenticate as Guest
OK
Cancel
Apply

3. Configure System-Wide DCOM settings

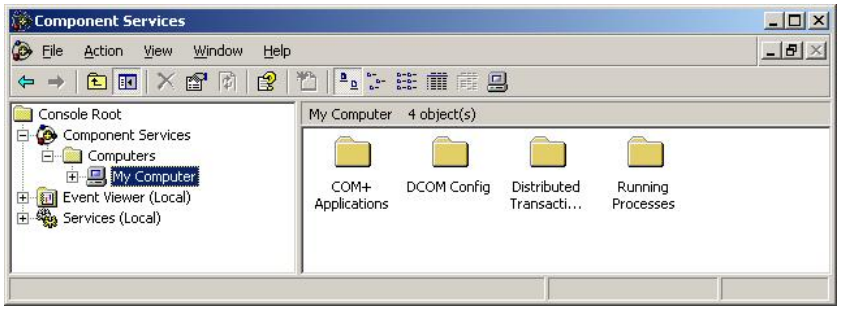
a. Click Window **Start** menu, and select the **Run** command.



b. In the “Run” dialog box, type “DCOMCNFG” to initiate the DCOM configuration process, and then click the **OK** button. The “Component Services” window will appear.

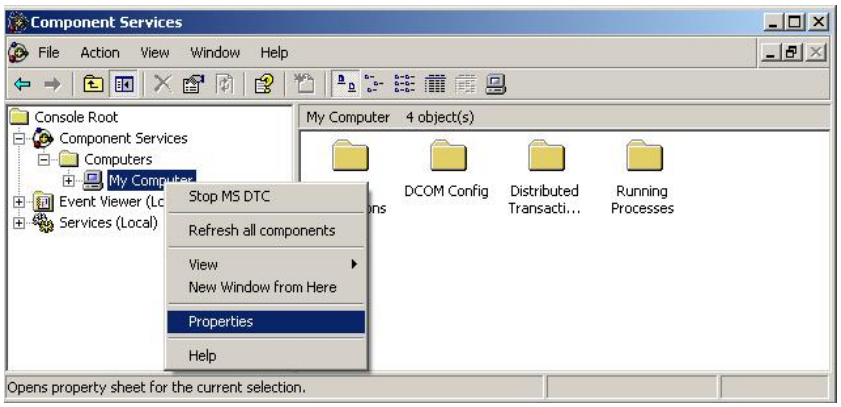


c. On “Component Services” window (which is initiated by DCOMCNFG as above), navigate the **Console Root**->**Component Services**->**Computers**->**My Computer** from tree view.

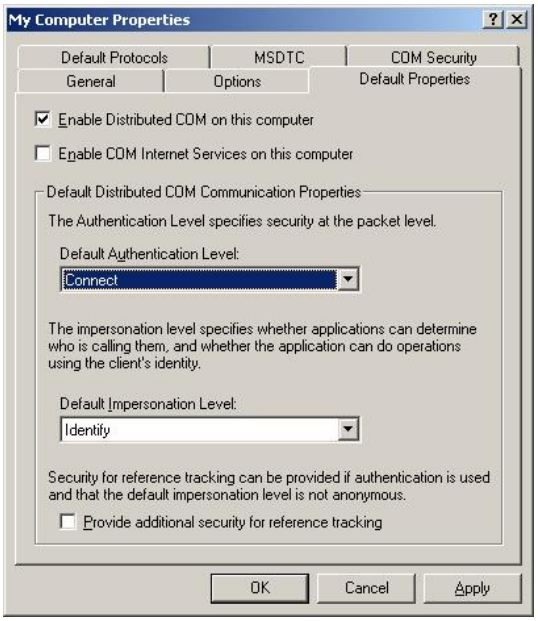


d. Right-click **My Computer** and then select the **Properties** command. Note that this is not the “My Computer” icon on your desktop; rather it is the “My Computer” tree control in the **Console Services**

application.

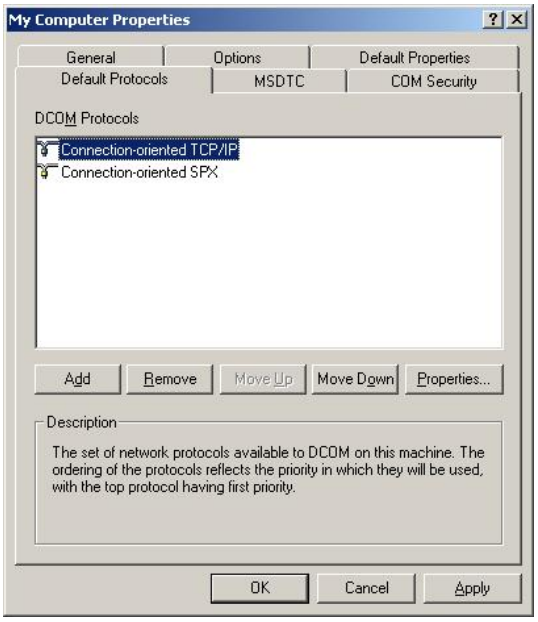


- ***Default Properties Setup***


My Computer Properties
Default Protocols
MSDTC
COM Security
General
Options
Default Properties
Enable Distributed COM on this computer
Enable COM Internet Services on this computer
Default Distributed COM Communication Properties
The Authentication Level specifies security at the packet level.
Default Authentication Level:
Connect
The impersonation level specifies whether applications can determine who is calling them, and whether the application can do operations using the client's identity.
Default Impersonation Level:
Identify
Security for reference tracking can be provided if authentication is used and that the default impersonation level is not anonymous.
Provide additional security for reference tracking
OK
Cancel
Apply

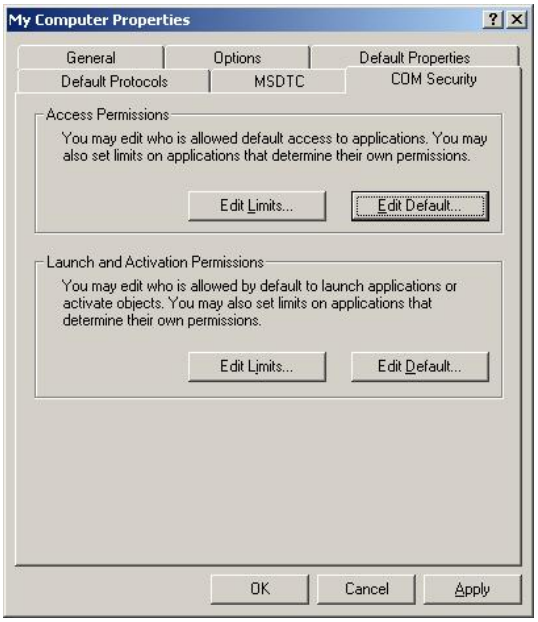
In **Default Properties** tab, ensure that three specific options are set as follows: check the **"Enable Distributed COM on this computer"** option, and note that you have to reboot the computer if make change to this checkbox; set the **"Default Authentication Level"** to **"Connect"**; set the **"Default Impersonation Level"** to **"Identify"**.

- ***Default Protocols Setup***



In **Default Protocols** tab, set the DCOM protocols to **"Connection-Oriented TCP/IP"**. It is possible to delete the rest of DCOM protocols. However, if these protocols are indeed required for non-OPC applications, you can leave them there. The only consequence is that timeouts may take a little longer to reach.

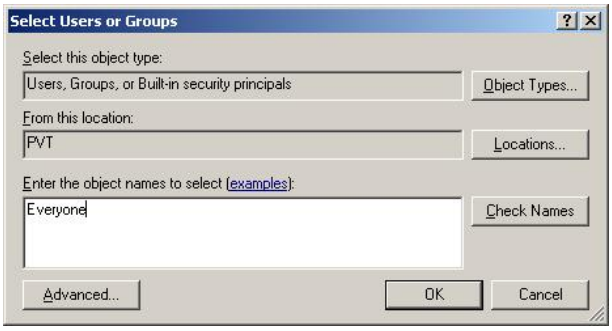
- ***COM Security Setup***

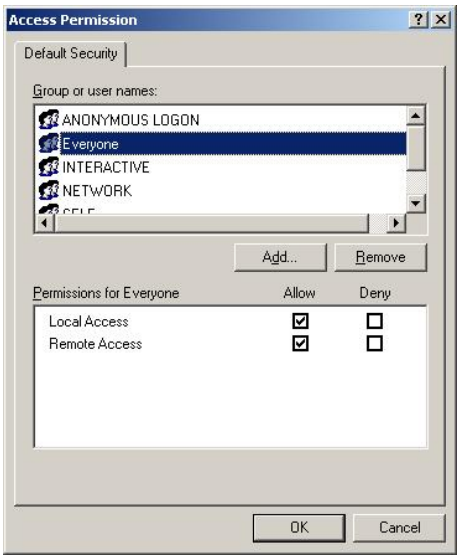

My Computer Properties
General
Options
Default Properties
Default Protocols
MSDTC
COM Security
Access Permissions
You may edit who is allowed default access to applications. You may also set limits on applications that determine their own permissions.
Edit Limits...
Edit Default...
Launch and Activation Permissions
You may edit who is allowed by default to launch applications or activate objects. You may also set limits on applications that determine their own permissions.
Edit Limits...
Edit Default...
OK
Cancel
Apply

Windows uses the **COM Security** tab to set the system-wide Access Control List (ACL) for all objects. The ACLs are included for Launch/Activation (ability to start an application), and Access (ability to exchange data with an application). Note that in some systems, the **Edit Limits** buttons are not available.

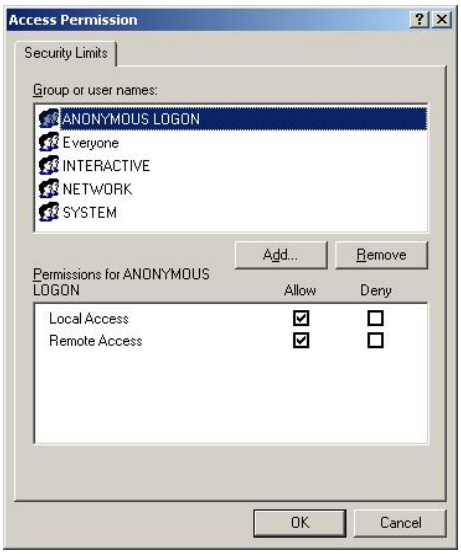
To set the right permissions, follow the steps below:

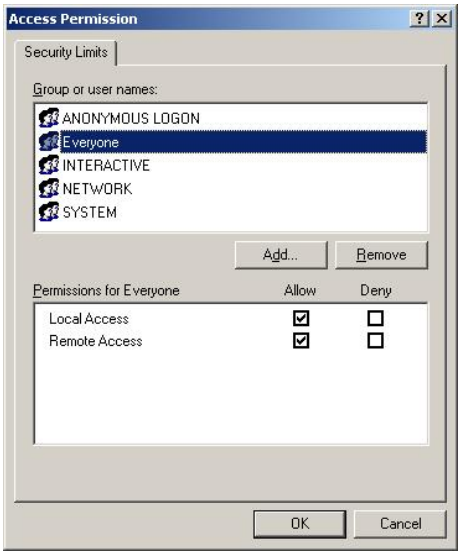
a) In the "Access Permissions" group, click **Edit Default…** button. Add **"Everyone"** to the list of "Group or user names". Refer to following pictures. Local Access and Remote Access permissions will be allowed for everyone. Click **OK** button.



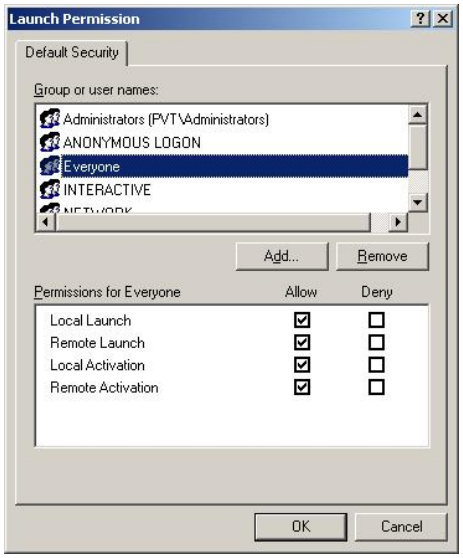


b) Then click **Edit Limits…** button in the "Access Permissions" group. Add **"Anonymous Logon"** (required for OPCEnum) and **"Everyone"** to the list of "Group or user names". Refer to following pictures. Local Access and Remote Access permissions will be allowed for anonymous and everyone. Click **OK** button.

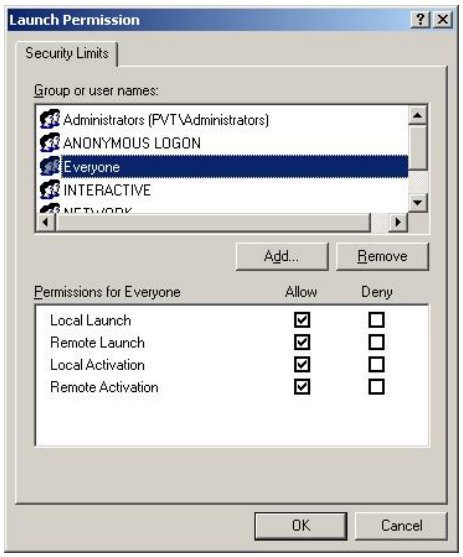




c) In the "Launch and Activation Permissions" group, click **Edit Default…** button. Add **"Everyone"** to the list of "Group or user names". Refer to the following picture. All permissions will be allowed for everyone. Click **OK** button.



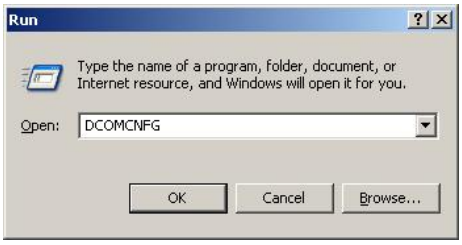
d) Then click **Edit Limits…** button in the "Launch and Activation Permissions" group. Add **"Everyone"** to the list of "Group or user names". Refer to the following picture. All permissions will be allowed for everyone. Click **OK** button.



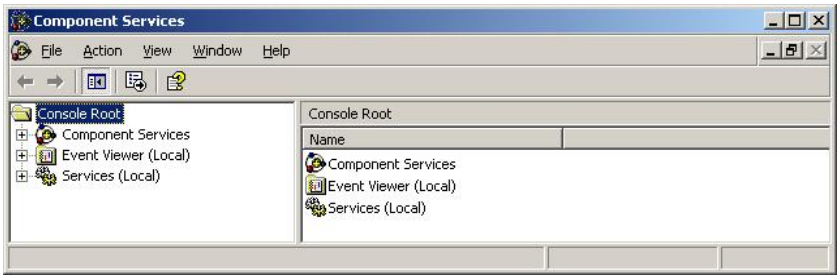
4. Configure Server specific DCOM settings

Once the system-wide DCOM settings are properly configured, turn attention to the server-specific DCOM settings, which will eventually be different for different OPC Server.

a. Click Windows **Start** menu, and select the **Run** command.



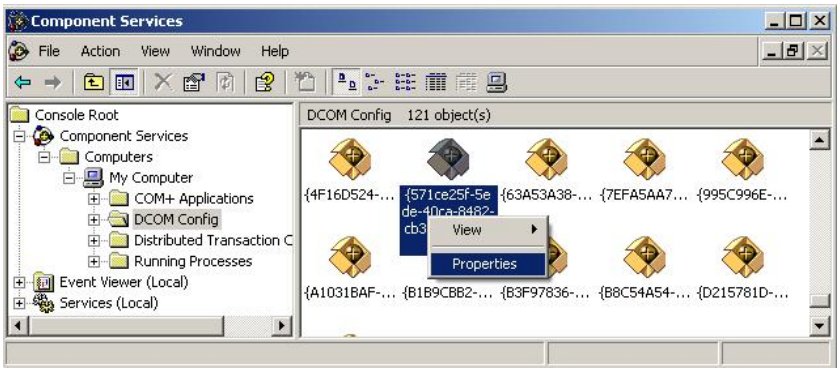
b. In the "Run" dialog box, type "DCOMCNFG" to initiate the DCOM configuration process, and click the **OK** button. The "Component Services" window will appear.



c. On "Component Services" window (which is initiated by DCOMCNFG as above), navigate **Console Root**->**Component Services**->**Computers** folder, then expand **My Computer**, and finally click the **DCOM Config** folder.



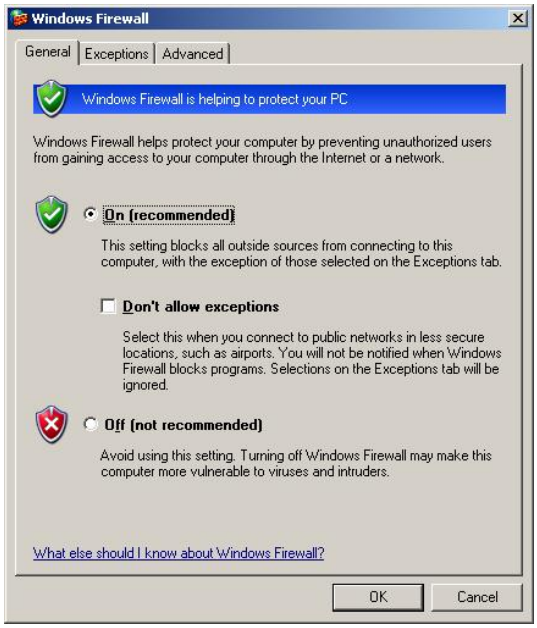
d. In the list of objects in the right window pane, find the OPC Server to configure and right-click it (for PCM360 OPC Server, the GUID is **"571ce25f-5ede-40ca-8482-cb331edf70ef"**). Then select the **Properties** command.



In the OPC-Server specific settings, only the **Identify** tab needs to change from the default settings. The rest of the tabs can refer to the default configuration that was set in “Configure System-Wide DCOM settings”. Check **“The interactive user”** option and click **OK** button.

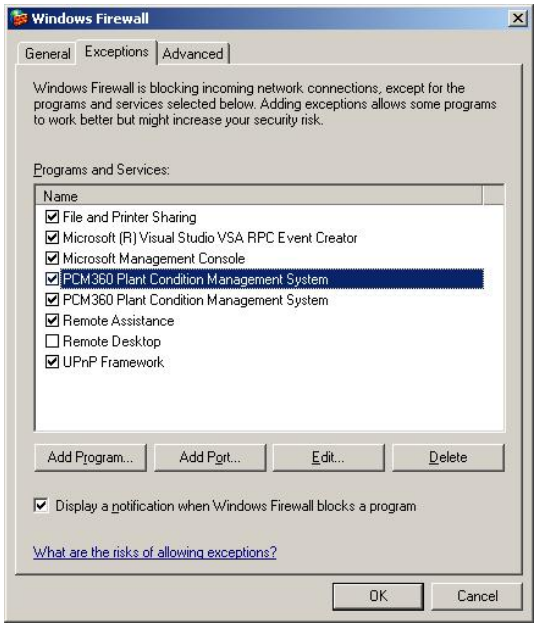


5. Restore Windows security

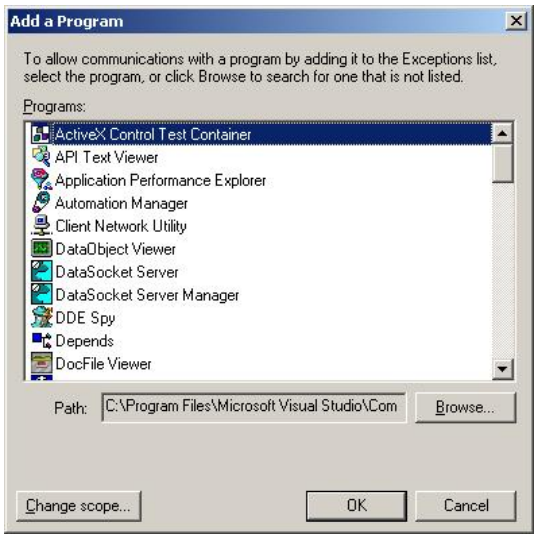

Windows Firewall
General
Exceptions
Advanced
Windows Firewall is helping to protect your PC
Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
On (recommended)
This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Don't allow exceptions
Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
Off (not recommended)
Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
What else should I know about Windows Firewall?
OK
Cancel

Turn on the Windows Firewall again. This will block all unauthorized network traffic. You will also need to provide exception on two main levels:

a. **Application level:** Specify which applications are able to respond to unsolicited requests.

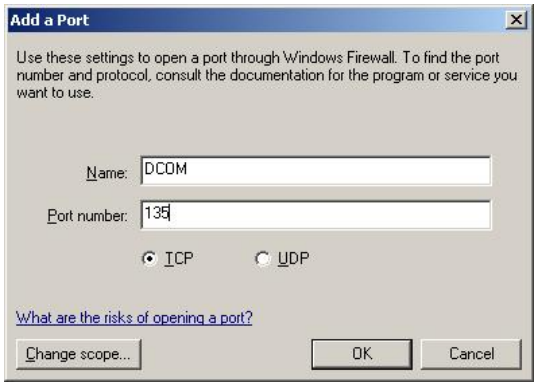

Windows Firewall
General
Exceptions
Advanced
Windows Firewall is blocking incoming network connections, except for the programs and services selected below. Adding exceptions allows some programs to work better but might increase your security risk.
Programs and Services:
Name
File and Printer Sharing
Microsoft (R) Visual Studio VSA RPC Event Creator
Microsoft Management Console
PCM360 Plant Condition Management System
PCM360 Plant Condition Management System
Remote Assistance
Remote Desktop
UPnP Framework
Add Program...
Add Port...
Edit...
Delete
Display a notification when Windows Firewall blocks a program
What are the risks of allowing exceptions?
OK
Cancel

On **Exception** tab of “Windows Firewall” window, click **Add Program** button.



Select the program to the Exceptions list.

b. **Port-and-protocol level:** Specify that the firewall should allow or deny traffic on a specific port for either TCP or UDP traffic. On **Exception** tab of “Windows Firewall” window, click **Add Port** button.


Add a Port
Use these settings to open a port through Windows Firewall. To find the port number and protocol, consult the documentation for the program or service you want to use.
Name: DCOM
Port number: 135
TCP
UDP
What are the risks of opening a port?
Change scope...
OK
Cancel

Type **DCOM** in "Name" edit box and type **135** in "Port number" edit box. And then select **TCP** option.

Configure OPC Client

Most configuration settings are the same as those of OPC Server, user could consult ***Configure OPC Server*** of this chapter for detailed operation.

1. Remove Windows security

Please refer to ***Configure OPC Server/Remove Windows security*** of this chapter.

2. Setup mutual User Account recognition

a. Adding User Account

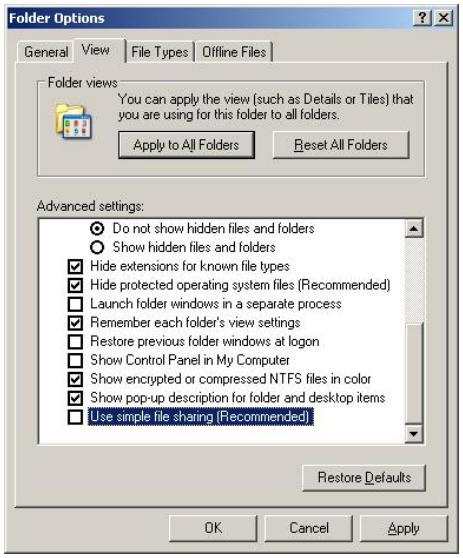
Ensure logon user name and password are matched those on PCM360 OPC Server. Add a new user called "Administrator" on third-party OPC Client and type the password of this user as "password". Ensure the current "Administrator" is added to "Administrators" group. See ***Configure OPC Server/Setup mutual User Account recognition*** of this chapter for details.

b. Turning off Simple File Sharing

Double-click **My Computer** on the desktop and select **Folder Options** command from **Tools** menu.



Click the **View** tab, and then clear the **"Use Simple File Sharing (Recommended)"** check box to turn off Simple File Sharing.


Folder Options
General
View
File Types
Offline Files
Folder views
You can apply the view (such as Details or Tiles) that you are using for this folder to all folders.
Apply to All Folders
Reset All Folders
Advanced settings:
Do not show hidden files and folders
Show hidden files and folders
Hide extensions for known file types
Hide protected operating system files (Recommended)
Launch folder windows in a separate process
Remember each folder's view settings
Restore previous folder windows at logon
Show Control Panel in My Computer
Show encrypted or compressed NTFS files in color
Show pop-up description for folder and desktop items
Use simple file sharing (Recommended)
Restore Defaults
OK
Cancel
Apply

3. Configure System-Wide DCOM settings

Please refer to ***Configure OPC Server/Configure System-Wide DCOM settings*** of this chapter.

4. Restore Windows security

Please refer to ***Configure OPC Server/Restore Windows security*** of this chapter.

Register PCM360 OPC Service

In PCM360 system, OPC service will be registered automatically when you install the PCM360 OPC Server software. And note that after installed the PCM360 OPC Server software, you should exit and restart the PCM360 Server software to enable OPC service.

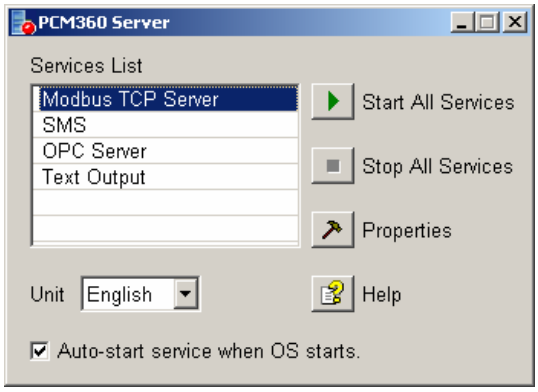
Prog ID *of PCM360 OPC service:* **PCM360 OPC-SERVER**

GUID *of PCM360 OPC service:* **{571ce25f-5ede-40ca-8482-cb331edf70ef}**

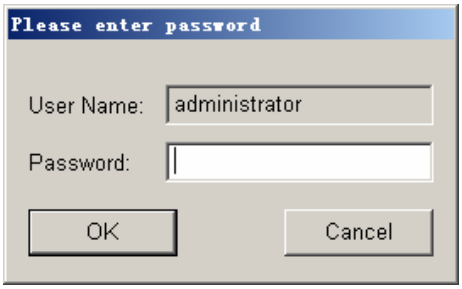
PCM360 Modbus TCP Server

PCM360 Modbus TCP Server could distribute Modbus data (real-time measured value and alarm status) to third-party system via Modbus TCP protocol.

Before data transmission, you should set the configuration and communication parameters. Open main window of PCM360 Server software and stop all services.

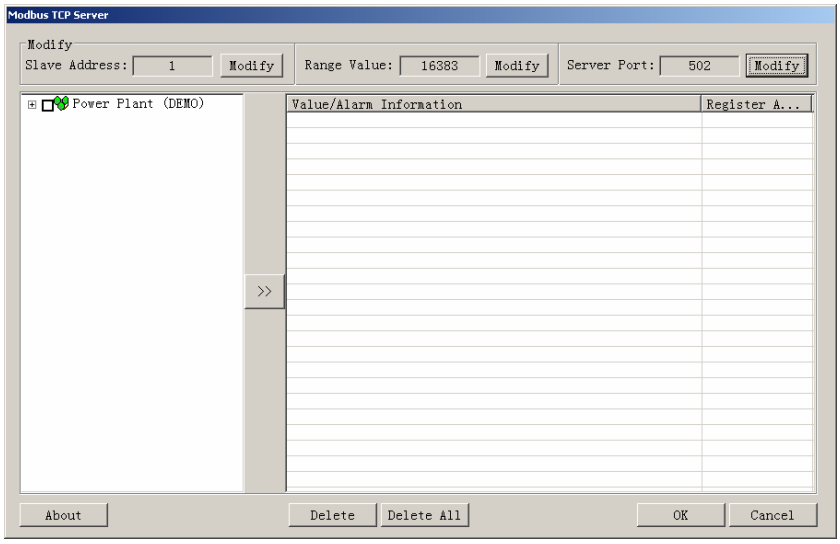


Select **Modbus TCP Server** from “Services List” and click **Properties** button.



Type the logon password of PCM360 administrator and click **OK** button. Then “Modbus TCP Server” window is launched.

Communication Parameters Setup



- **Slave Address, Modify:**

Slave Address: Slave address of Modbus TCP Server. User can click **Modify** button and type a slave address in the edit box. See picture below, **Modify** button changes to **Confirm** button. Click this button to save the slave address. PCM360 automatically specifies the default slave address as ”1”.



- **Range Value, Modify:**

Range Value: Modbus full scale range. The analog signal will be converted into a digital format. So this field allows you to specify the range of the digital format. Click **Modify** button to change the value. See picture below: **Modify** button changes to **Confirm** button. Click this button to save the range value. PCM360 automatically specifies the default range value as “16383”.



- **Server Port, Modify:**

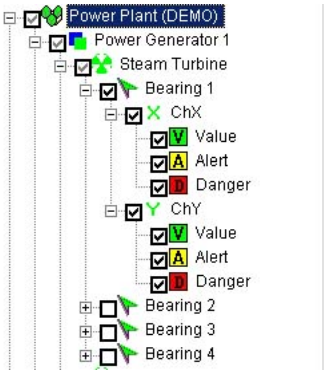
A Socket port for communication between Modbus TCP Server and Client (the default is “502”). To change the network port, click **Modify** button and type the available port in the edit box, later click **Confirm** button.

Transferred Items Setup

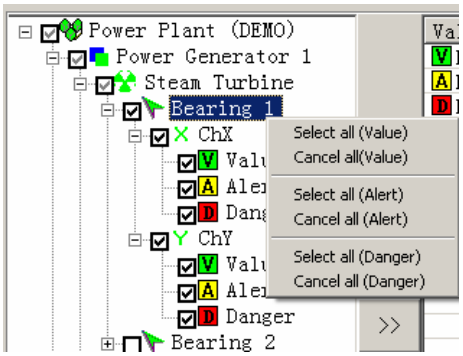
Modbus TCP Server transfers real-time measured value and alarm status of measurement points (machines, machine trains, and plants). Following steps show detailed operation of specifying the transferred items.

a. **Select items:** There are two methods to select items to transfer.

Method 1: From tree hierarchy view, check the check box before a node and then all components beneath this node are checked. For example: if check “Bearing 1”, the measured values and alarm statuses of both “ChX” and “ChY” beneath “Bearing 1” are all selected.



Method 2: Right click a node from tree hierarchy and a shortcut menu pops up. Click the related command to select items.

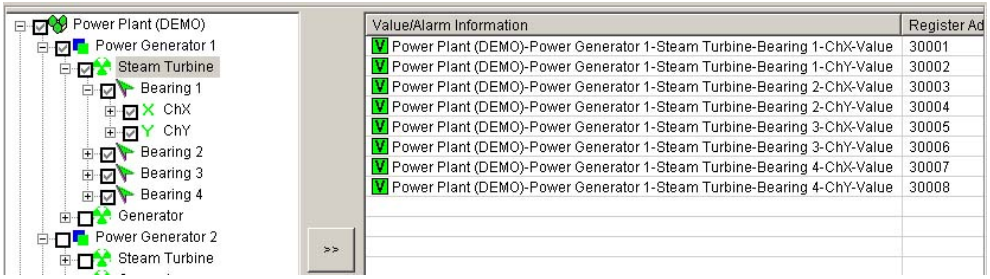


- ✓ **Select all (Value):** If selected, all value items beneath this node are checked.
- ✓ **Cancel all (Value):** If selected, all selected value items beneath this node are unchecked.
- ✓ **Select all (Alert):** If selected, all alert items beneath this node are checked.
- ✓ **Cancel all (Alert):** If selected, all selected alert items beneath this node are unchecked.
- ✓ **Select all (Danger):** If selected, all danger items beneath this node are checked.
- ✓ **Cancel all (Danger):** If selected, all selected danger items beneath this node are unchecked.

b. Move specified items to "items to be transferred" list:

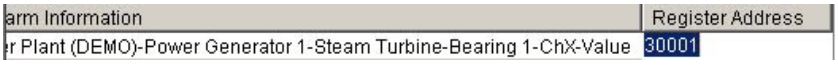
After finished selecting the items, click 

button to add them to the "items to be transferred" list. In following picture, the list shows all value items beneath "Steam Turbine". The first column displays name of the item and the second column displays the register address that related to the item.


Power Plant (DEMO)
Power Generator 1
Steam Turbine
Bearing 1
ChX
ChY
Bearing 2
Bearing 3
Bearing 4
Generator
Power Generator 2
Steam Turbine
>>
Value/Alarm Information
Register Ad
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX-Value 30001
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChY-Value 30002
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChX-Value 30003
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChY-Value 30004
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 3-ChX-Value 30005
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 3-ChY-Value 30006
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 4-ChX-Value 30007
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 4-ChY-Value 30008

c. Change register address:

System will automatically assign a register address for every selected item. You can change the register address to another unused one: double click register address of an item and type another one in the edit box.



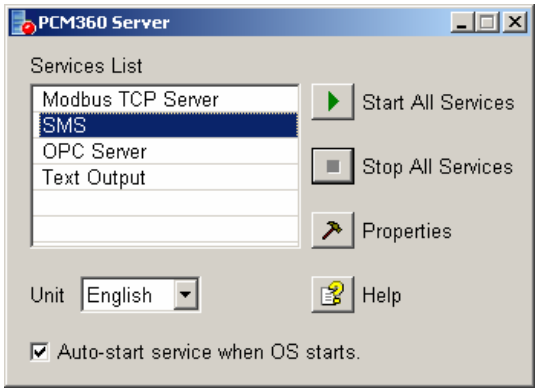
d. Delete items from items list:

- ✓ **Delete (Button):** Use this button to delete an item from “items to be transferred” list. Select an item and click **Delete** button. The selected item is deleted.
- ✓ **Delete All (Button):** Use this button to delete all items from “items to be transferred” list. Directly click **Delete All** button and all items are deleted.

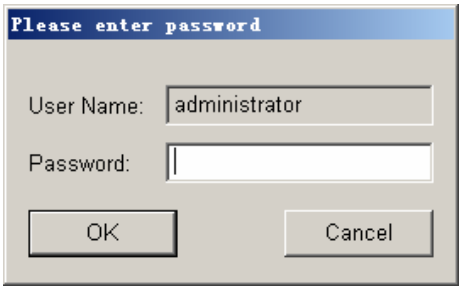
PCM360 SMS

PCM360 SMS Service is used to send messages that contain collected data information of predefined measurement points to the cellular phones.

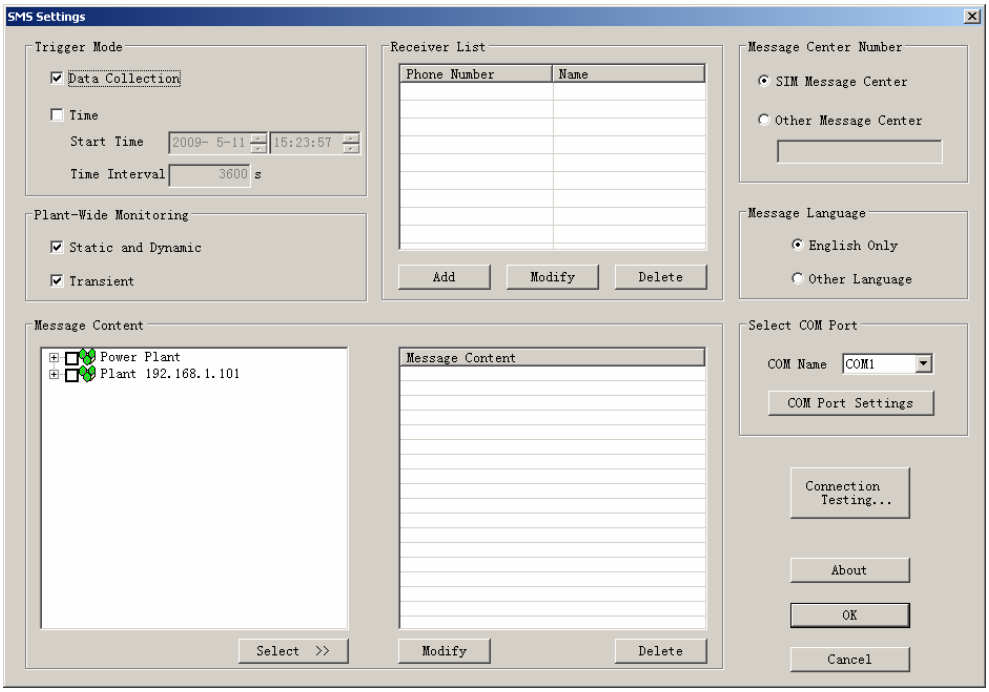
Before data transmission, you should set the configuration and communication parameters. Open main window of PCM360 Server software and stop all services. See picture below:



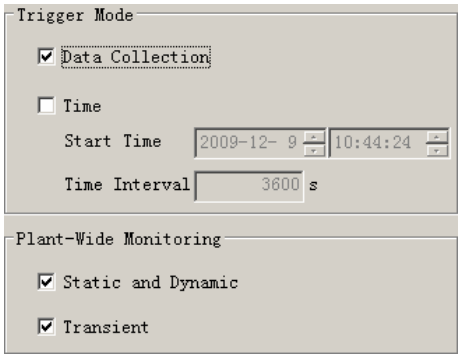
Select **SMS** from “Services List” and click **Properties** button.



Type the logon password of PCM360 administrator and click **OK** button. Then “SMS Settings” window is launched.



Trigger Mode Setup



- **Data Collection**

In this mode, once the machine train displayed in “Message Content” list starts to collect data, messages that contain information about this machine train will be sent. The “Data Collection” parameters were set on “Static and Dynamic Data Collection Setup” window and “Transient Data Collection Setup” window on DAQ &COM software.

- **Time**

In this mode, you should set the start time and interval. The SMS module will be triggered at the “Start Time” and send messages at regular intervals beginning with “Start Time”. The messages contain information of all machine trains in “Message Content” list.

- **Plant-Wide Monitoring**

NOTE: It works only when “Data Collection” trigger mode is unchecked.

In this mode, once a machine train monitored by your PCM360 system is triggered to collect data, a message that contains information of the triggered machine train will be sent. The machine train that is sent in the messages has no relations with what you specified in “Message Content” list.

✓ **Static and Dynamic**

If checked, when the machine train is triggered to collect static and dynamic data, a message that contains information of the triggered machine train will be sent. The conditions of data collection were set on “Static and Dynamic Data Collection Setup” window on DAQ &COM software.

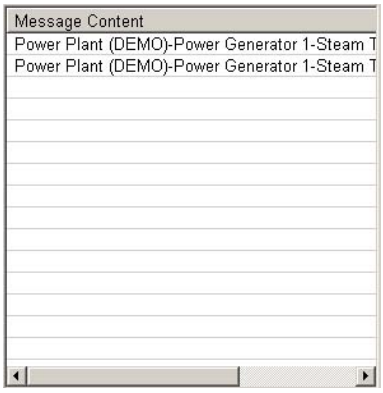
✓ **Transient**

If checked, when the machine train is triggered to collect transient data, a message that contains information of the triggered machine train will be sent. The conditions of data collection were set on “Transient Data Collection Setup” window on DAQ &COM software.

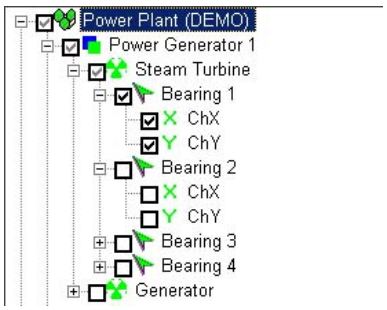
- **“ASK” trigger mode**

The function allows user to receive messages by sending a message with content of **“ASK”** to SMS module. When the SMS module receives your message, it will reply messages that contain real-time data information of all machine trains in “Message Content” list.

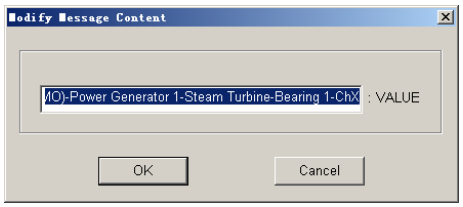
Message Content Settings



When checked “Data Collection” or “Time” trigger mode, the information of the related machine trains in this list will be sent. Follow steps to specify the interested items:



1. Check the concerned measurement points (machines, or machine trains) from the tree hierarchy view.
2. Click Select >> button to move the selected items to “Message Content” list.
3. Modify name of the item as your needs: Select an item from the list and then click **Modify** button (or directly double-click this message item). Type the new name and click **OK** button. This name will be displayed in the message.



4. Delete the items by clicking **Delete** button.

Tip: Pressing “Shift” key on keyboard could select more items one time, or left click your mouse and drag a rectangle, and all items in the rectangle are selected.

NOTES:

1. One message only contains information of items underneath the same machine train. For example, two machine trains “Power Generator 1” and “Power Generator 2” are triggered at the same time. And you will receive two messages: one contains all selected items about “Power Generator 1” and another contains all selected items about “Power Generator 2”.
2. **Length limit:** In English message language, a message can contain up to 160 characters. And in other languages, a message can contain up to 70 characters. In a transmission, if the message content exceeds the maximum length, this message will be split into two or more messages.
3. The message contents will be a little different when SMS module is triggered by different trigger mode.

- In “Data Collection” mode, the message content is shown like below:

Trigger Mode: Static and Dynamic Data Collection 2009-12-9 10:57:17 Power Generator 1 Manual Trigger Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX: 318.58um

- In “Time” mode, the message content is shown like below:

Trigger Mode: Time 2009-12-9 10:45:00 Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX: 259.25um

- In “Plant-Wide Monitoring” mode, the message content is shown like below:

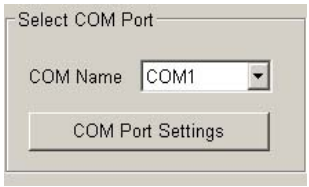
Plant-Wide Monitoring: Static and Dynamic Data Collection 2009-12-9 11:02:53 Power Generator 1 Alarm Trigger

- In “ASK” mode, the message content is shown like below:

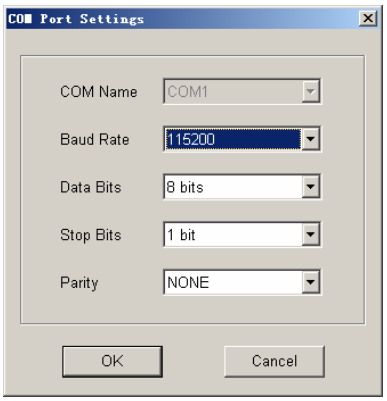
2009-12-9 14:45:00 Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX: 218.63um

Communication Parameter Settings

Configure the proper communication parameters to ensure that Server software can well communicate with the SMS module.



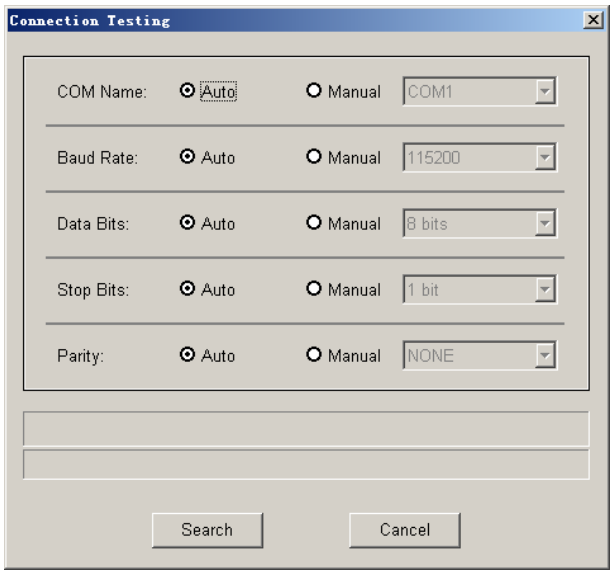
1. Select an available COM port first: COM1 or COM2;
2. Click **COM Port Settings** button to open “COM Port Settings” window and set the related parameters.



Connection Testing

Before sending message, make sure Server software and SMS module can communicate with each other. Following steps introduce how to test the communication.

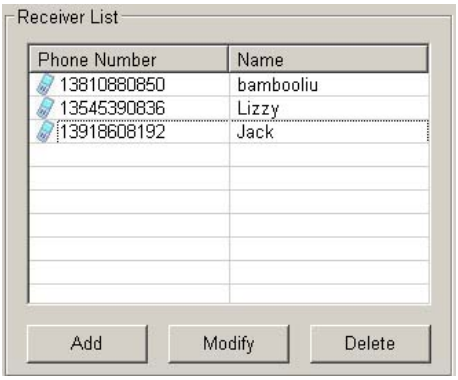
1. Click **Connection Testing** button to launch “Connection Testing” window.



2. Configure proper communication parameters. If you don’t know the communication parameters, you can select “Auto” option and click **Search** button to let software scan parameters automatically. If the scanning succeeds, you will be asked to refresh the parameters on “COM Port Settings” window. To reduce the scanning time, we recommend that you manually set the parameters you knew.

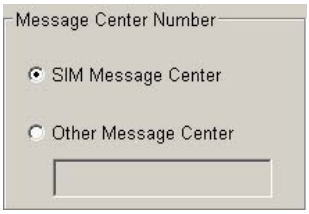
Receiver List Settings

Edit cell phone number and name of the related receivers. You can add and delete receivers and modify their phone number or name by clicking the related buttons.



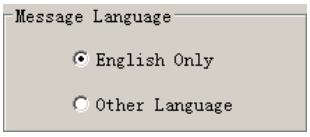
Message Center Settings

Set number of the message service center:



- **SIM Message Center:** Use message center of internal SIM card.
- **Other Message Center:** Use another available message center. If checked, you should type an available message center number in the edit box.

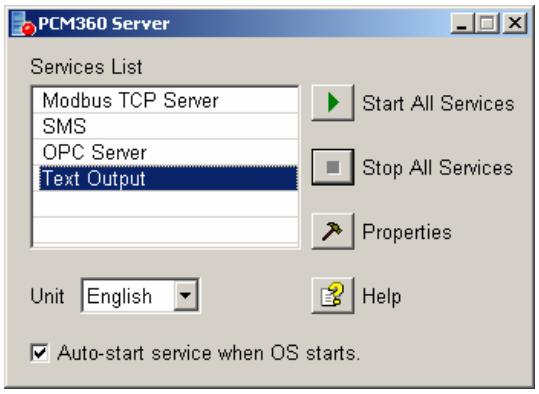
Message Language Setup



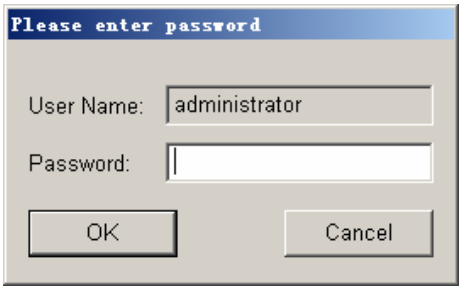
Choose a proper message language as your needs. If the message only contains letters and numbers, we recommend that you select “English Only” option; if the message also contains other symbols like Chinese characters, you should select “Other Language” option. Each message can contain up to 160 characters in English message language and contain up to 70 characters in others.

PCM360 Text Output

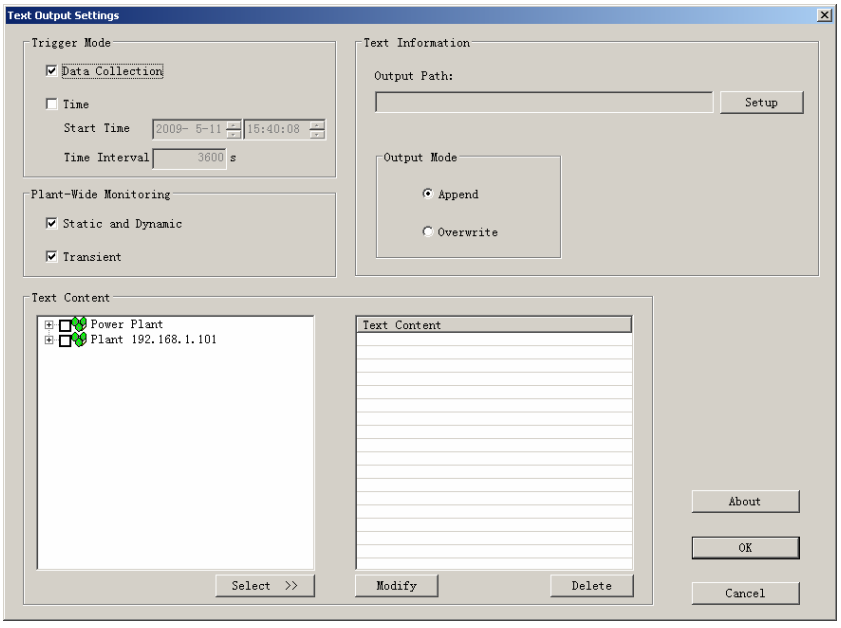
With Text Output service, PCM360 system could record measured value information of the selected channels into a user-customized text file. Open main window of PCM360 Server software and stop all services.



Select **Text Output** from “Services List” and click **Properties** button.



Type the logon password of PCM360 administrator and click **OK** button. Then “Text Output Settings” window is launched.

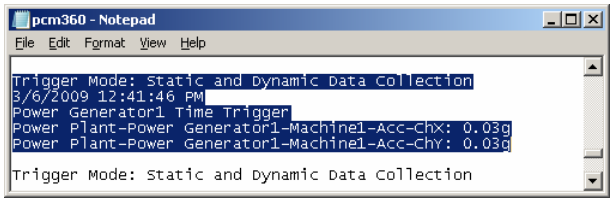


Trigger Mode Setup

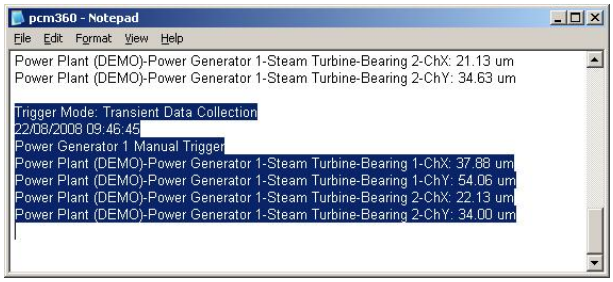
- **Data Collection**

In this mode, once the machine train displayed in “Text Content” list starts to collect data, information of the items of this machine train will be saved in the text file. The “Data Collection” parameters were set on “Static and Dynamic Data Collection Setup” window and “Transient Data Collection Setup” window on DAQ &COM software.

Picture below shows the text information that was recorded because of static and dynamic data collection trigger on “Power Generator 1”.


pcm360 - Notepad
File Edit Format View Help
Trigger Mode: Static and Dynamic Data Collection
3/6/2009 12:41:46 PM
Power Generator1 Time Trigger
Power Plant-Power Generator1-Machine1-Acc-ChX: 0.03g
Power Plant-Power Generator1-Machine1-Acc-ChY: 0.03g
Trigger Mode: Static and Dynamic Data Collection

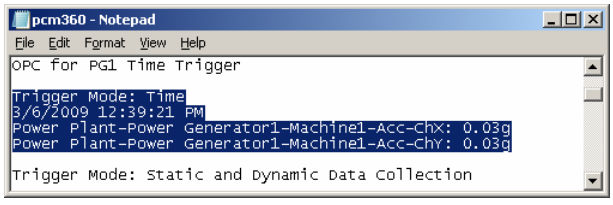
Picture below shows the text information that was recorded because of transient data collection trigger on “Power Generator 1”.


pcm360 - Notepad
File Edit Format View Help
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChX: 21.13 um
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChY: 34.63 um
Trigger Mode: Transient Data Collection
22/08/2008 09:46:45
Power Generator 1 Manual Trigger
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX: 37.88 um
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChY: 54.06 um
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChX: 22.13 um
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChY: 34.00 um

- **Time**

In this mode, you should set the start time and interval. The information of all items in “Text Content” list will be saved at regular intervals beginning with “Start Time”.

Picture below shows the text record of the measurement point named “ACC”.


pcm360 - Notepad
File Edit Format View Help
OPC for PG1 Time Trigger
Trigger Mode: Time
3/6/2009 12:39:21 PM
Power Plant-Power Generator1-Machine1-Acc-ChX: 0.03g
Power Plant-Power Generator1-Machine1-Acc-ChY: 0.03g
Trigger Mode: Static and Dynamic Data Collection

- **Plant-Wide Monitoring**

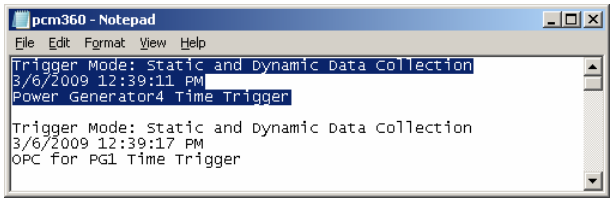
NOTE: It works only when "Data Collection" trigger mode is unchecked.

In this mode, once a machine train monitored in your PCM360 system is triggered to collect data, the information of the triggered machine train will be saved in the text file. The machine train of which information is saved has no relations with what you specified in "Text Content" list.

✓ **Static and Dynamic**

If checked, when the machine train is triggered to collect static and dynamic data, the information concerning trigger mode of the machine train will be saved. The conditions of data collection were set on "Static and Dynamic Data Collection Setup" window on DAQ &COM software.

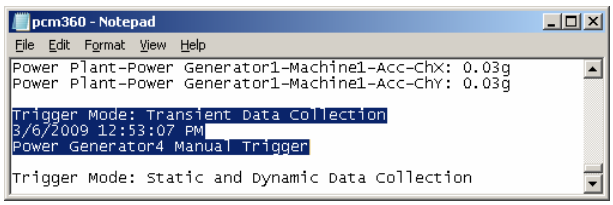
Picture below shows the text information that was recorded because of static and dynamic data collection trigger on "Power Generator4".


pcm360 - Notepad
File Edit Format View Help
Trigger Mode: Static and Dynamic Data Collection
3/6/2009 12:39:11 PM
Power Generator4 Time Trigger
Trigger Mode: Static and Dynamic Data Collection
3/6/2009 12:39:17 PM
OPC for PG1 Time Trigger

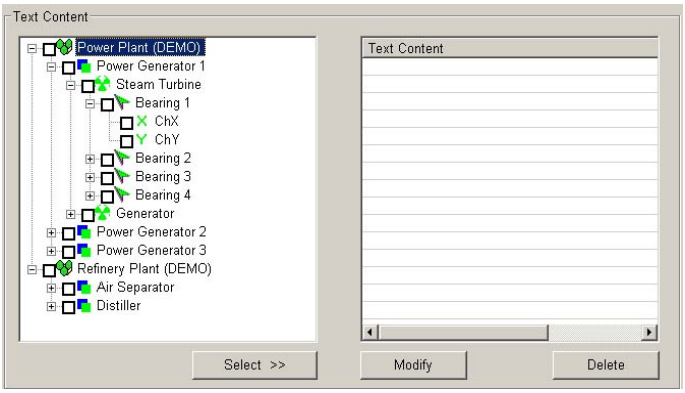
✓ **Transient**

If checked, when the machine train is triggered to collect transient data, the information concerning trigger mode of the machine train will be saved. The conditions of data collection were set on "Transient Data Collection Setup" window on DAQ &COM software.

Picture below shows the text information that was recorded because of transient data collection trigger on "Power Generator4".

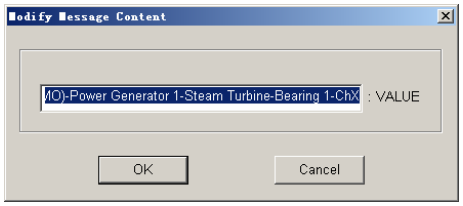

pcm360 - Notepad
File Edit Format View Help
Power Plant-Power Generator1-Machine1-Acc-ChX: 0.03g
Power Plant-Power Generator1-Machine1-Acc-ChY: 0.03g
Trigger Mode: Transient Data Collection
3/6/2009 12:53:07 PM
Power Generator4 Manual Trigger
Trigger Mode: Static and Dynamic Data Collection

Text Content Settings



When checked “Data Collection” or “Time” trigger mode, the information of the related machine trains in this list will be saved in the text file. Follow steps to specify the interested items:

1. Check the concerned measurement points (machines or machine trains) from the tree hierarchy view.
2. Click Select >> button to move the selected items to “Text Content” list.
3. Modify name of the item as your needs: Select an item from the list and then click **Modify** button (or directly double-click this message item). Type the new name and click **OK** button. This name will be displayed in the text.



4. Delete the items by clicking **Delete** button.

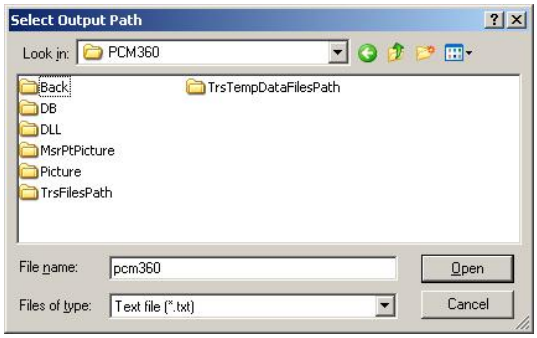
Tip: Pressing “Shift” key on keyboard could select more items one time, or left click your mouse and drag a rectangle, and all items in the rectangle are selected.

Text File Setup

- **Output Path Setup**

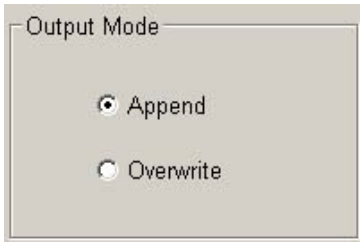


Click **Setup** button to set the file path to save the text with information of machine trains in “Text Content” list.



On window above, select the path and type the file name.

- **Output Mode Setup**



If you select “Append” option, the new text information will be recorded behind the old ones in the file, and if you select “Overwrite” option, the new information will replace the old one in the file.

PCM360 Devices

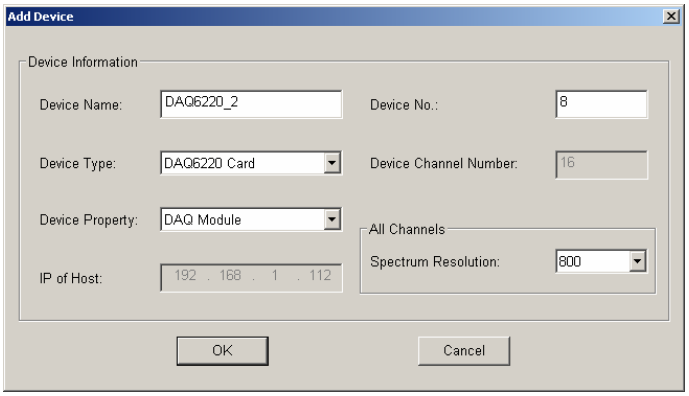
DAQ Cards

PCM360 system works with three types of DAQ Cards: DAQ6013, DAQ6220, and DAQ6250.

Adding DAQ Card

Before add a DAQ card, make sure the related card driver and hardware DAQ cards are installed on local DAQ Server.

Run DAQ&COM software and log on it. Stop the DAQ module and then select **Device Management** command from **Setup** menu. On “Device Management” window, click **Add** button.

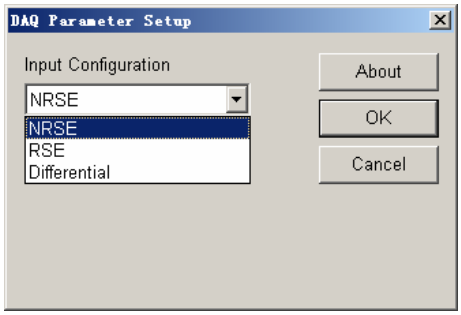


The device type depends on the DAQ Card type you selected when installing PCM360 DAQ&COM software. Set parameters of the card and then click **OK** button. For more information about the parameters, refer to ***PCM360 DAQ&COM SOFTWARE OPERATON/Setup Menu/Device Management*** of this manual.

NOTE: For DAQ card, the channel number is specified as 16 and can’t be changed.

Extended Definition for DAQ Card

On “Device Management” window, select a DAQ card device and then click **Extended Definition** button. “DAQ Parameter Setup” window appears. Note that the DAQ card must be installed on local DAQ Server.



Available work modes for DAQ card: **NRSE**, **RSE**, **Differential**.

- **NRSE:** Nonreferenced single-ended mode—all measurements are made with respect to a common (NRSE) measurement system reference, but the voltage at this reference can vary with respect to the measurement system ground.
- **RSE:** Referenced single-ended mode-all measurements are made with respect to a common reference measurement system or a ground. Also it is called a grounded measurement system.
- **Differential:** A differential measurement system has neither of its inputs tied to a fixed reference, such as earth or building ground. A differential measurement system is similar to a floating signal source in that the measurement is made with respect to a floating ground that is different from the measurement system ground. Hand-held, battery-powered instruments and DAQ devices with instrumentation amplifiers are examples of differential measurement systems. If you set the work mode as Differential, only 8 channels (from channel0-channel7) are able to work.

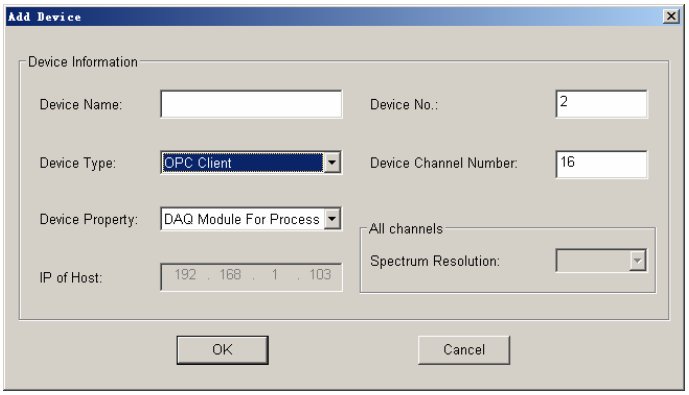
PCM360 OPC Client

In PCM360 system, DAQ device with type of OPC Client can import process data from the third-party OPC Servers that are compliant with both OPC data access version 1.0 and 2.0. The retrieved data will be converted into the format that can be understood and used by PCM360 system.

To successfully get the data from the third-party OPC Server, both the PCM360 OPC Client and third-party OPC Server should be correctly configured. The manufacturer of OPC Server should provide the configuration details for the Client and Server.

Adding PCM360 OPC Client Device

Run DAQ&COM software and log on it. Stop the DAQ module and then select **Device Management** command from **Setup** menu. On “Device Management” window, click **Add** button.

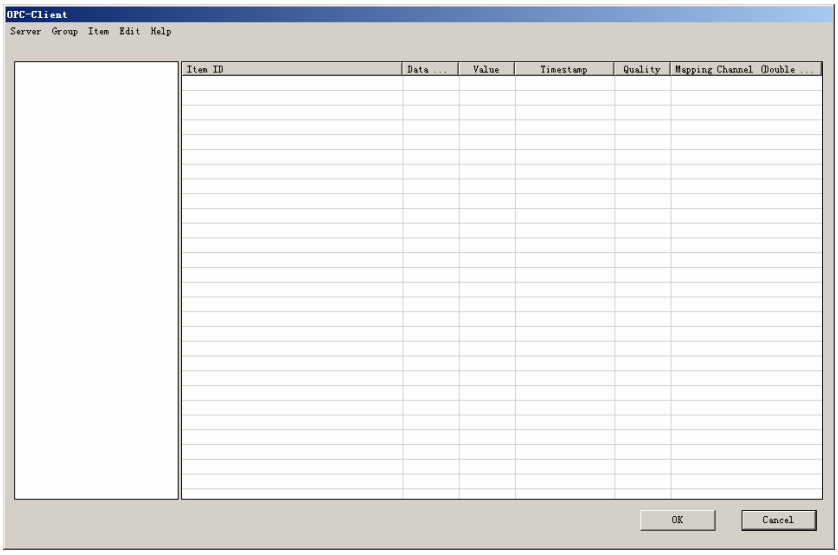


- ✓ **Device Type:** OPC Client;
- ✓ **Device Property:** DAQ Module For Process;

Set other parameters according to your requirement, and later click **OK** button. For more information about the parameters, please refer to ***PCM360 DAQ&COM SOFTWARE OPERATION/Setup Menu/Device Management*** of this manual.

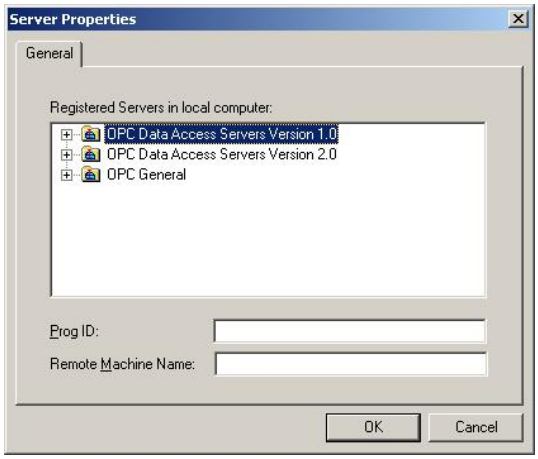
Extended Definition for OPC Client Device

On “Device Management” window, select an OPC Client device and then click **Extended Definition** button. “OPC-Client” window appears (see picture below).



Connect to an OPC Server

Select **New Server Connection** command from **Server** menu.



Registered Servers in local computer (List): List all registered servers supported with different OPC versions on local computer.

Prog ID: The ID that is registered by the OPC Server. The OPC Client uses Prog ID to identify the OPC Server from which data will be retrieved. This ID can be in local or remote computer specified by the OPC Server name. If it is in local computer, you can directly select the Prog ID from “Registered Servers in local computer” list; otherwise you should manually enter the Prog ID.

Remote Machine Name: Machine name of the registered OPC Server. IP Address and computer name all work.

OK (Button): Click this button to establish the connection between OPC Client and the selected OPC Server.

- ✓ If OPC Client succeeded in connecting to OPC Server, the OPC Server name will be marked with green icon as follows:



- ✓ If OPC Client failed to connect to OPC Server, the OPC Server name will be marked with red icon as follows:



Cancel (Button): Click this button to cancel the connection operation.

Re-connect to an OPC Server

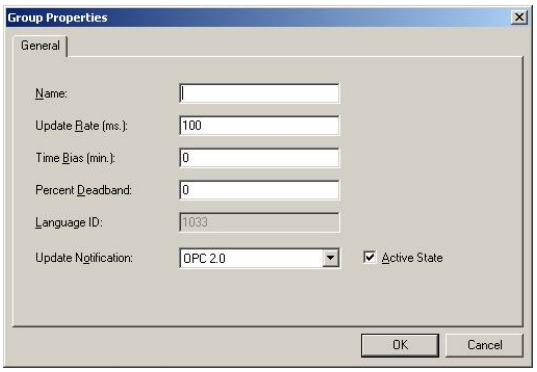
Reconnect command is used to recover communications between OPC Client and OPC Servers, OPC Groups, and OPC Items. Select the OPC Server and then select **Reconnect** from **Server** menu (or right click the OPC Server and then select **Reconnect** from shortcut menu).



Add New Group

Select an OPC Server from “OPC Server” list first and then select **New Group** from **Group** menu (or right click the OPC Server and then select **New Group** command from shortcut menu).





Name: The name of the group to be added under the OPC Server. **The group name should be unique beneath the same OPC Server.**

Update Rate (ms): Fastest rate at which data changes may be sent for items in this group. This also indicates the desired accuracy of Cached Data. The value 0 indicates the server should use the fastest practical rate.

Time Bias (min): It works when OPC Client and Server are resided over different time zones.

Percent Deadband: Percentage change in the item’s value that should cause an update to happen on the Client. The deadband is used to keep noisy signals from updating the Client unnecessarily. The valid range of values is from 0.0 to 100.0. Deadband will only apply to items in the group that have an Engineering Units (EU) type of Analog as defined in OPC Specifications. A value of 0 indicates that data should be updated for any change in the item’s value. Following is the calculation used to determine if the item value will be updated when the deadband is a non-zero value. The (EU High –EU Low) represents the usual range of the item value. Data will be updated if:

Absolute value of (last cached value-current value) > (Percent Deadband/100)*(EU High-EU Low)

Language ID: ID of the language set. It is specified as 1033 with shaded edit box.

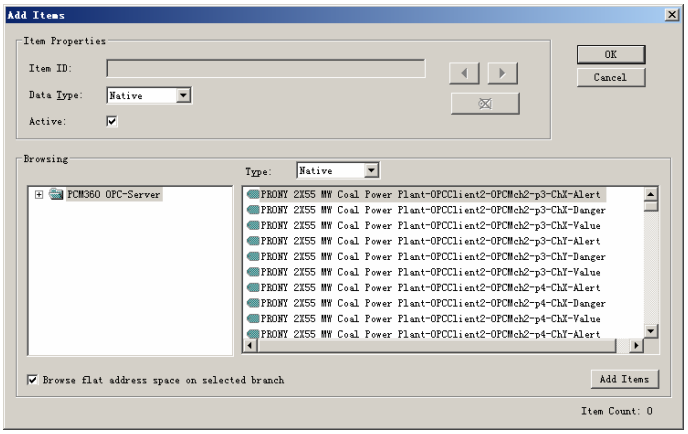
Update Notification: The OPC interface supported by OPC Server.

Active State: If selected, all items beneath this group are configured active, otherwise all items beneath this group are considered inactive and data of this group will not be collected.

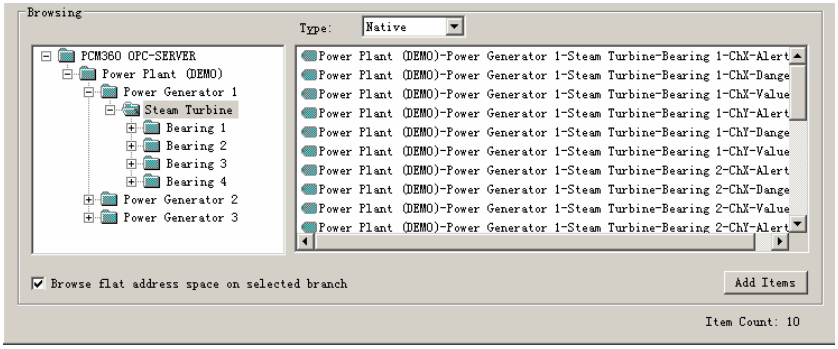
Add New Item

From the list, select a group under an OPC Server, and then select **New Item** command from **Item** menu (or right click the group and then select **New Item** from shortcut menu).





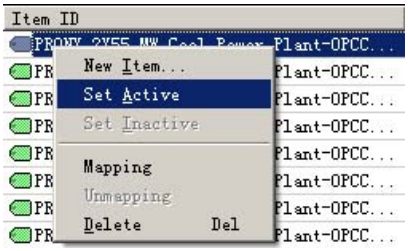
- **Item ID:** Display the new added items.
  - ✓  : Click it to display the previous item. If the current item is the first item, this button will be disabled.
  - ✓  : Click it to display the next item. If the current item is the last item, this button will be disabled.
  - ✓  : Click it to delete the selected item.
- **Date Type:** There are two options: Native and Float. If you select “Native”, type of the data retrieved from OPC Server won’t be converted; if you select “Float”, the data type will be converted to float type compulsively by OPC Client.
- **Active (Check box):** Check it to active the new added items.
- **Browsing:**


Browsing
Type:
Native
PCM360 OPC-SERVER
Power Plant (DEMO)
Power Generator 1
Steam Turbine
Bearing 1
Bearing 2
Bearing 3
Bearing 4
Power Generator 2
Power Generator 3
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX-Alert
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX-Dange
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChX-Value
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChY-Alert
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChY-Dange
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 1-ChY-Value
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChX-Alert
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChX-Dange
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChX-Value
Power Plant (DEMO)-Power Generator 1-Steam Turbine-Bearing 2-ChY-Alert
Browse flat address space on selected branch
Add Items
Item Count: 10

- ✓ **OPC Server's View:** Show hierarchy of the selected OPC Server and all components beneath this Server.
- ✓ **Items List:** Display available items.
- ✓ **Type (List):** Use this to filter items with other data types. If you select "Float", items only with float data type are displayed on Items list.
- ✓ **Browse flat address space on selected branch (Check box):** If selected, all items under the selected node on **OPC Server's View** will be shown on **Items List**. If not selected, items will be shown only when the selected node is the direct-parent-node of the items.
- ✓ **Add Item (Button):** Select an item from Items List and then click this button to add the item to the group. Try following methods to add multi-items once: Press **Shift** key on keyboard and then select the items you want to add; or left-click the mouse and then drag a rectangle. The items in the rectangle are selected.

Activate an Item

Select the inactive item from item list, and then select **Set Active** from **Item** menu (Or right click this item and select **Set Active** from shortcut menu).



Inactivate an Item

Select an activated item and select **Set Inactive** from **Item** menu (Or right click this item and select **Set Inactive** from shortcut menu).



When an item is inactive, OPC Client won't retrieve data of this item from OPC Server and the related icon color shows gray.

Set Item Update Interval

Select **Item Update Interval** from **Item** menu. In the window below, type interval value and then click **OK** button. The value should be integer within the range from 100 to 30000.



This operation applies to all items beneath this OPC Server.

Map the Item with Channel

- **Item List**

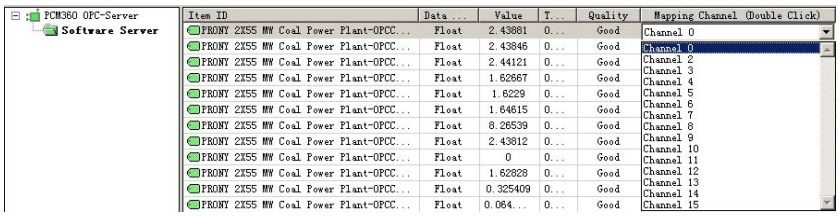
Select a group from OPC Server hierarchy and items beneath this group are all displayed.

- ✓ **Item ID:** The identifier of the item in OPC Server.
- ✓ **Data Type:** The data type of item displayed on OPC Client.
- ✓ **Value:** Display item value.
- ✓ **Timestamp:** Timestamp indicates the time, at which the server updated and validated the value and quality in its cache. Timestamp is supported by OPC Server of 1.0 (with timestamp) and later version. OPC Server with higher version returns timestamp for data along with the value.
- ✓ **Quality:** It represents the quality state for an item's data value.

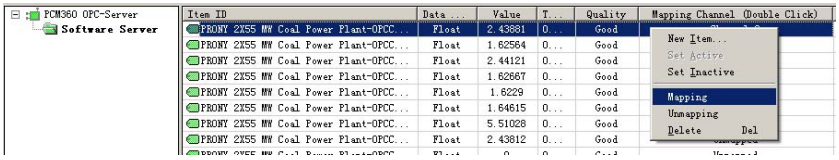
- **Map the item with channel**

Three methods to map an item with a device channel.

Method 1: Double click **Mapping Channel** of the selected item and then select the channel from the list.



Method 2: Right click this item and then select **Mapping** from the drop down list, and later select the channel from the list.

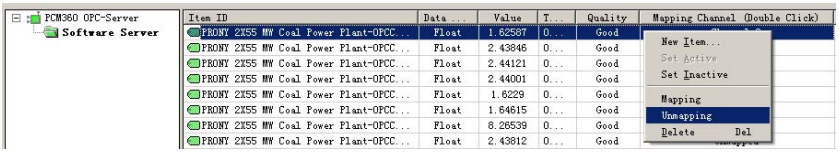


Method 3: Select the item and then select **Mapping** command from **Item** menu.

- **Unmap the item**

Two methods to unmap an item:

Method 1: Right click a mapped item and then select **Unmapping** from shortcut menu.



Method 2: Select the mapped item and select **Unmapping** command from **Item** menu.

Delete

- **Delete a server**

On “OPC-Client” window, select an OPC Server and select **Delete** command from **Edit** menu (or right click the OPC Server and then select **Delete** from shortcut menu);



After the operation, all groups and items under this OPC Server are removed.

- **Delete a group**

On “OPC-Client” window, select a group under an OPC Server, and then select **Delete** command from **Edit**

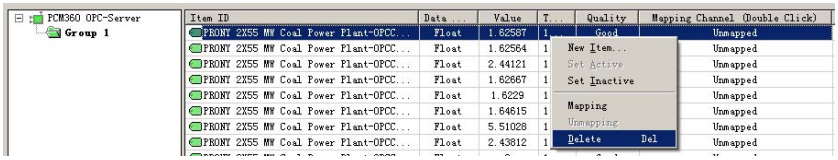
menu (or right click this group and then select **Delete** from shortcut menu);



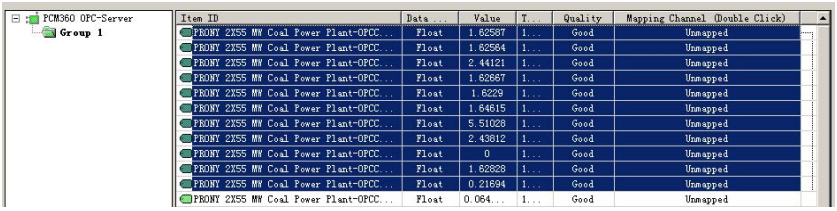
After the operation, all items under this group will be removed.

- **Delete an item (items)**

On “OPC-Client” window, select an item from Item List and then select **Delete** command from **Edit** menu (or right click this item and then select **Delete** from shortcut menu);



To remove multi-items once, follow the methods below: Drag a rectangle on the Item List and then items in this rectangle are selected (or press **Shift** on keyboard and select the items you want to remove), and later select **Delete** from **Edit** menu to remove all the selected items.

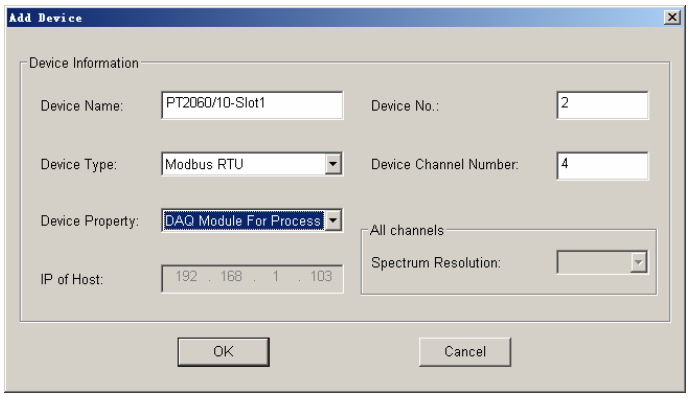


PCM360 Modbus RTU

Device with Modbus RTU type transfers Modbus data via Serial Protocol.

Adding PCM360 Modbus RTU Device

Run DAQ&COM software and log on it. Stop the DAQ module and then select **Device Management** command from **Setup** menu. On “Device Management” window, click **Add** button.



- ✓ **Device Type:** Modbus RTU.
- ✓ **Device Channel Number:** Type the actual channel number of the device. For DW device, this field is gray and disabled.
- ✓ **Device Property:** Type the actual device property.

Table below lists the Modbus RTU devices from ProvibTech.

Device Property	Device	Device Channel Number
DAQ Module For Process	DTM	1
	PT580	1
	DM200	2
	PT2060 Rack	Depends on the number of signal modules on the Rack
	PT371	16
4-20mA Output Module	PT372	4
Relay Module	PT373	16
DAQ Module For DW	DTM10-201, DTM10-301, DTM20-101	—
	DM200	—

NOTE: When DTM and DM200 are used for transferring DW data, we strongly recommend that user sets the baud rate of hardware device as 38400bps or 115200bps.

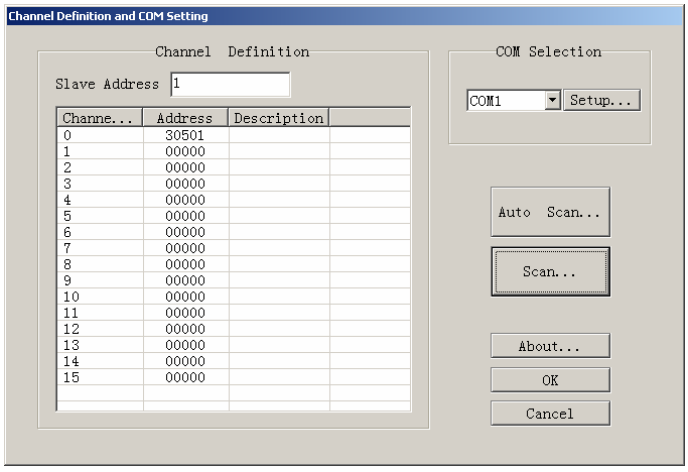
Set other parameters according to the field requirements, and then click **OK** button. For more detailed information, refer to ***PCM360 DAQ&COM SOFTWARE OPERATION/Setup Menu/Device Management*** of this manual.

Extended Definition for Modbus RTU Device

Devices based on Modbus RTU with different device property may have different extended definition window.

- ***Modbus RTU devices with properties of "DAQ Module For Process", "4-20mA Output Module", and "Relay Module"***

On "Device Management" window, select the device and then click **Extended Definition** button. Picture below shows the "Channel Definition and COM Setting" window of the device.



Slave Address: Slave address is used to distinguish devices that connect to the same COM port. It is usually set by the configuration software of the related device. You should type correct slave address of the current device in this field.

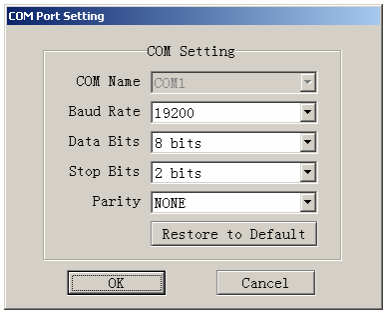
Channel Definition: Double-click a channel, and following dialog box pops up. Type the proper register address and description words. And then click **OK** button.



- ✓ **Channel No.:** Display channel No. list.
- ✓ **Address:** The register address indicates the location in the device where the data is read. To get the register address of devices, please go to ***Appendix IV***, ***Appendix V***, ***Appendix VI***, and ***Appendix VII***.
- ✓ **Description:** Short words to describe this channel.

COM Selection: Select an available COM port and click **Setup** button. "COM Port Setting" window appears. Select proper communication parameters and click **OK** button. On the window, clicking **Restore to Default**

button will set communication parameters to the default value. See picture below:



Auto Scan (Button)

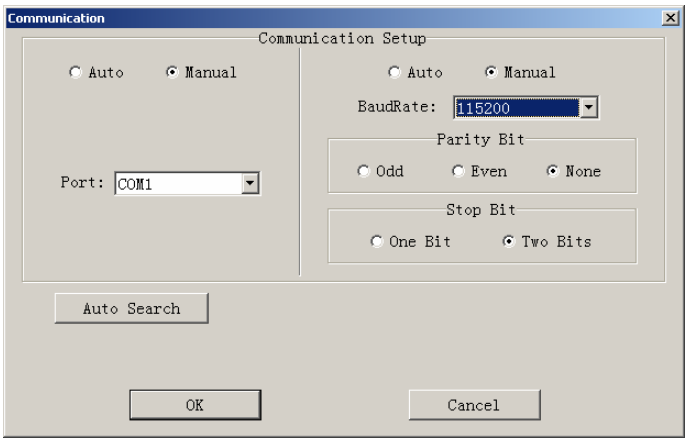
The function is used to automatically test the communication between software and hardware device. When scanning succeeds, the communication parameters will be refreshed.

NOTE: Before communication parameters are scanned automatically, ensure that slave address and channel register address of device are correctly set.

Scan (Button)

NOTE: Before the communication parameters are scanned, ensure that slave address and channel register address of device are correctly set.

Click this button to launch “Communication” window.



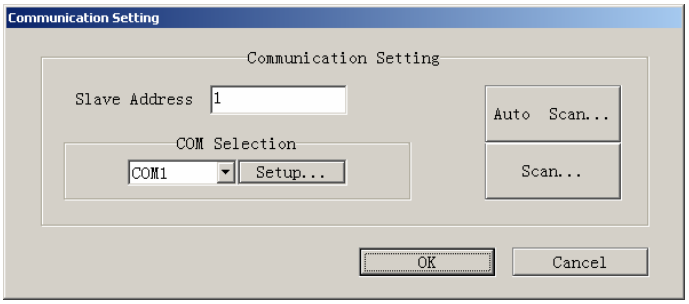
- ✓ **Port:** List the available COM ports on DAQ Server.
  - **Auto:** If selected, PCM360 will automatically scan the available COM port.
  - **Manual:** If selected, you should select a COM port from “Port” combo box.
- ✓ **BaudRate, Parity Bit, Stop Bit**

- **Auto:** If selected, PCM360 will automatically scan the proper communication parameters.
- **Manual:** If selected, you should manually set the communication parameters.

Auto Search (Button): Click this button to let software automatically scan the available port and proper communication parameters. If scanning succeeds, all communication parameters will be refreshed. And if it fails, a failed window will be launched to inform you.

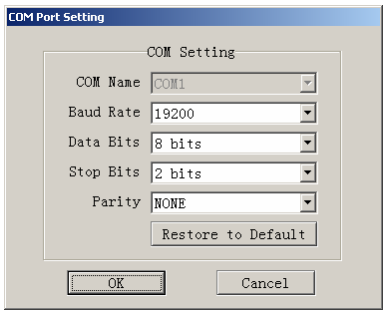
- ***DW device based on Modbus RTU***

On "Device Management" window, select a DW device and click **Extended Definition** button. Then "Communication Setting" window appears.



Slave Address: A field which allows multiple devices to share the same computer. These devices would be connected to the same COM port but would be distinguished by their individual slave address. For DW devices, slave address is always set by the configuration software of the related device. You should type correct slave address of the current device in this field.

COM Selection: Select an available COM port and click **Setup** button. "COM Port Setting" window appears. Set proper communication parameters and click **OK** button. **We recommend that user sets the baud rate of DW device to 38400 or 115200 Bps!**



Auto Scan (Button)

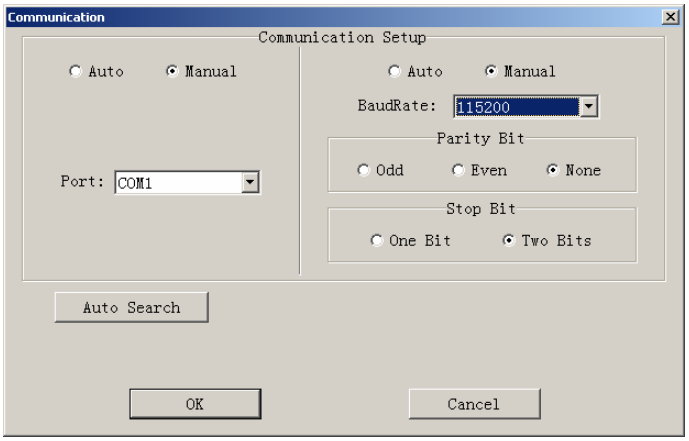
The function is used to automatically test the communication between software and hardware device. When scanning succeeds, the communication parameters will be refreshed.

NOTE: Before communication parameters are scanned automatically, ensure that slave address and channel register address of device are correctly set.

Scan (Button)

NOTE: Before the communication parameters are scanned, ensure that slave address and channel register address of device are correctly set.

Click this button to launch “Communication” window.



- ✓ **Port:** List the available COM ports on DAQ Server.
  - **Auto:** If selected, PCM360 will automatically scan the available COM port.
  - **Manual:** If selected, you should select a COM port from “Port” combo box.
- ✓ **BaudRate, Parity Bit, Stop Bit**
  - **Auto:** If selected, PCM360 will automatically scan the proper communication parameters.
  - **Manual:** If selected, you should manually set the communication parameters.

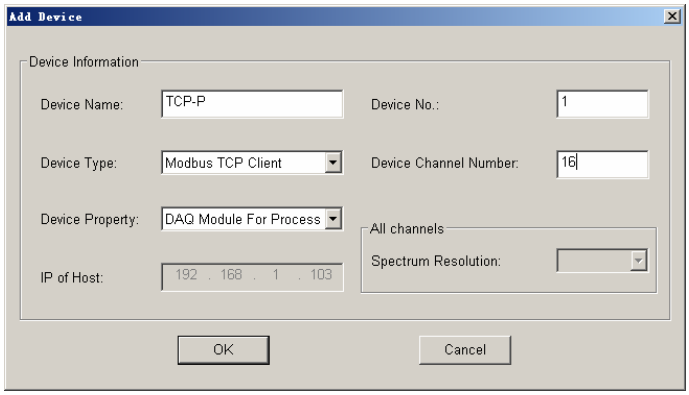
Auto Search (Button): Click this button to let software automatically scan the available port and proper communication parameters. If scanning succeeds, all communication parameters will be refreshed. And if it fails, a failed window will be launched to inform you.

PCM360 Modbus TCP Client

Device with Modbus TCP Client type transfers Modbus data via Modbus TCP Protocol.

Adding PCM360 Modbus TCP Client Device

Run DAQ&COM software and log on it. Stop the DAQ module and then select **Device Management** command from **Setup** menu. On “Device Management” window, click **Add** button.



- ✓ **Device Type:** Modbus TCP Client.
- ✓ **Device Channel Number:** Type the actual channel number of the device. For DW device, this field is gray and disabled.
- ✓ **Device Property:** Type the actual device property.

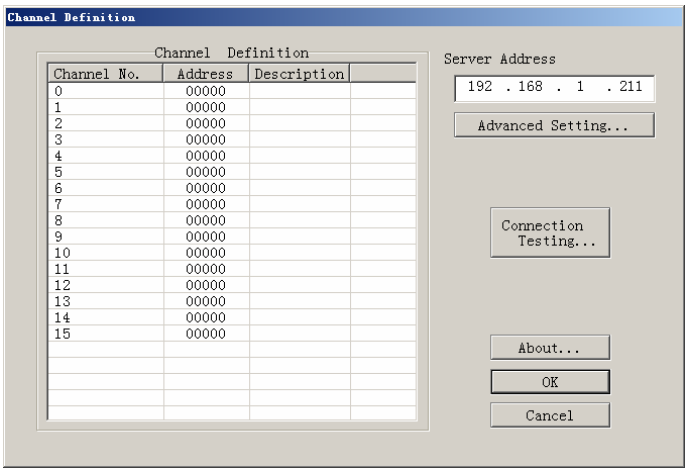
Set other parameters according to the field requirements, and then click **OK** button. For more detailed information, refer to ***PCM360 DAQ&COM SOFTWARE OPERATION/Setup Menu/Device Management*** of this manual.

Extended Definition for Modbus TCP Client Device

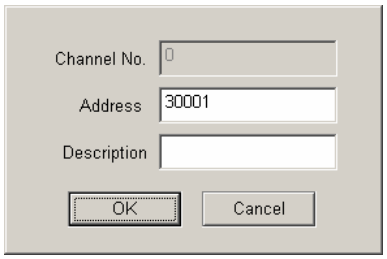
Modbus TCP Client devices with different device property may have different extended definition. For Modbus TCP Client devices with properties of “DAQ Module For Process”, “4-20mA Output Module”, and “Relay Module”, they have the same extended definition. Note that the device must reside on local DAQ Server.

- ***Extended definition for Modbus TCP Client device with properties of “DAQ Module For Process”, “4-20mA Output Module”, and “Relay Module”***

On “Device Management” window, select a device with the property above and click **Extended Definition** button. Then “Channel Definition” window appears. See picture below.

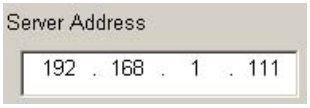


Channel Definition: Double-click a channel, following dialog box pops up. Type the proper register address and description words. And then click **OK** button.

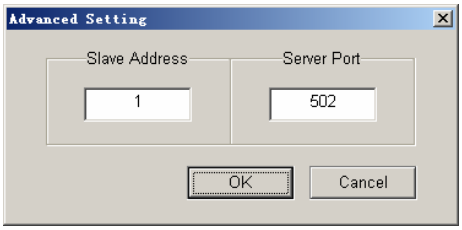


- ✓ **Channel No.:** Display channel No. list.
- ✓ **Address:** The register address indicates the location in the device where the data is read.
- ✓ **Description:** Short words to describe this channel.

Server Address: Type the IP address of the Modbus TCP Server.



Advanced Setting (Button): Click this button to launch “Advanced Setting” window.



- ✓ **Slave Address:** Slave address of the third-party Modbus TCP Server.
- ✓ **Server Port:** A Socket port for communication between Modbus TCP Client and Server (the default is “502”). Modbus TCP Client must have the same server port with Modbus TCP Server.

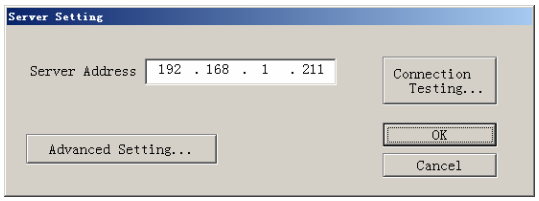
Connection Testing (Button)

NOTE: Before testing the connection, please ensure that you have correctly set device channels on both Client and Server.

Click this button, and then PCM360 will automatically test the communication between the Client and Server. The communication result will be launched then.

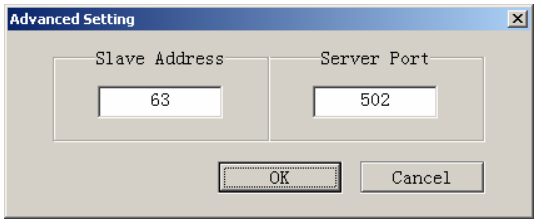
- ***Extended definition for DW device based on Modbus TCP***

On "Device Management" window, select a DW device and click **Extended Definition** button. Then "Server Setting" window is launched. See picture below.



Server Address: Type the IP address of the current Modbus RTU-TCP Converter unit that connects the DW devices.

Advanced Setting (Button): Click this button to launch "Advanced Setting" window.



- ✓ **Slave Address:** Type the slave address (also called slave ID or device ID) of the current DW device.
- ✓ **Server Port:** The port that is used by PCM360 and Modbus RTU-TCP Converter to communicate with each other. The default is 502.

Connection Testing (Button)

NOTES: Before test the connection, please ensure the following:

1. The wiring between Modbus RTU-TCP Converter unit and DW devices are correct (Refer to ***Modbus RTU-TCP Converter*** of this manual), or else the device can't work normally.
2. The Modbus RTU-TCP Converter unit was configured by MGate Manager software. The communication parameters of the Modbus RTU-TCP Converter unit must match those of DW devices.

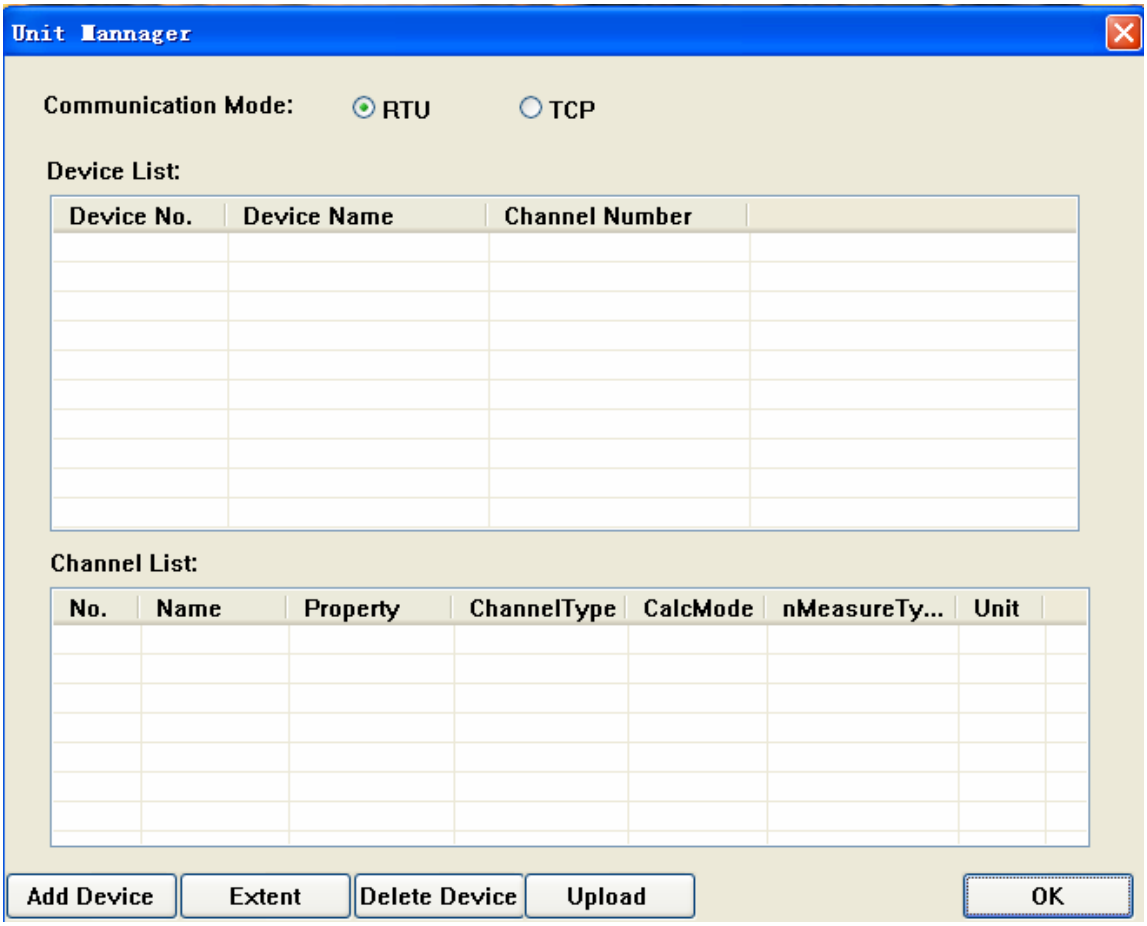
Click this button, and then PCM360 will try to connect the DW device. The communication result will be launched later.

- ***Modbus Group Virtual Device***

The DTM of ProvibTech, which has only one channel, can be organized as one virtual device with two channels, which called Modbus Group device，the DTM of a modbus group device called ‘Unit’。

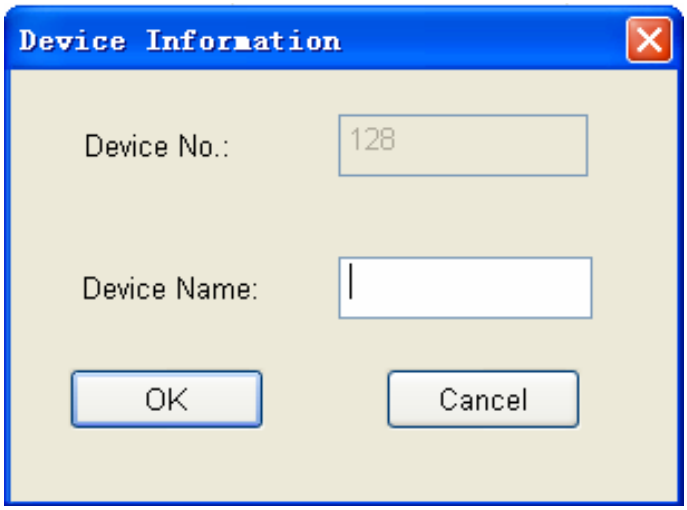
If there are Modbus Groups in a PCM360 System, the device number from 128 to 255 will reserved for ‘Unit’， forbid to assign to other type of device。A Modbus Group and its units must be assigned continues device number, the first unit has the same device number to the Modbus Group device it belongs.

Select a Modbus Group device，click the button extent，the Unit Manager will pop up as follows:

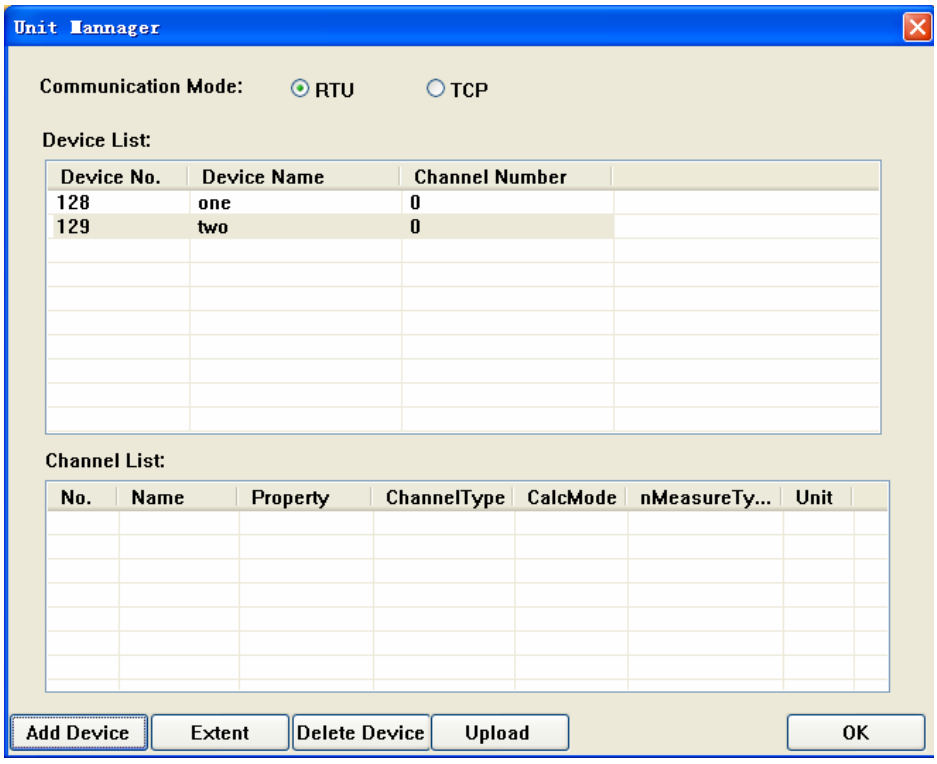


Choose **RTU or TCP mode** according to the actual. Note only one mode for a DAQ node is permitted.

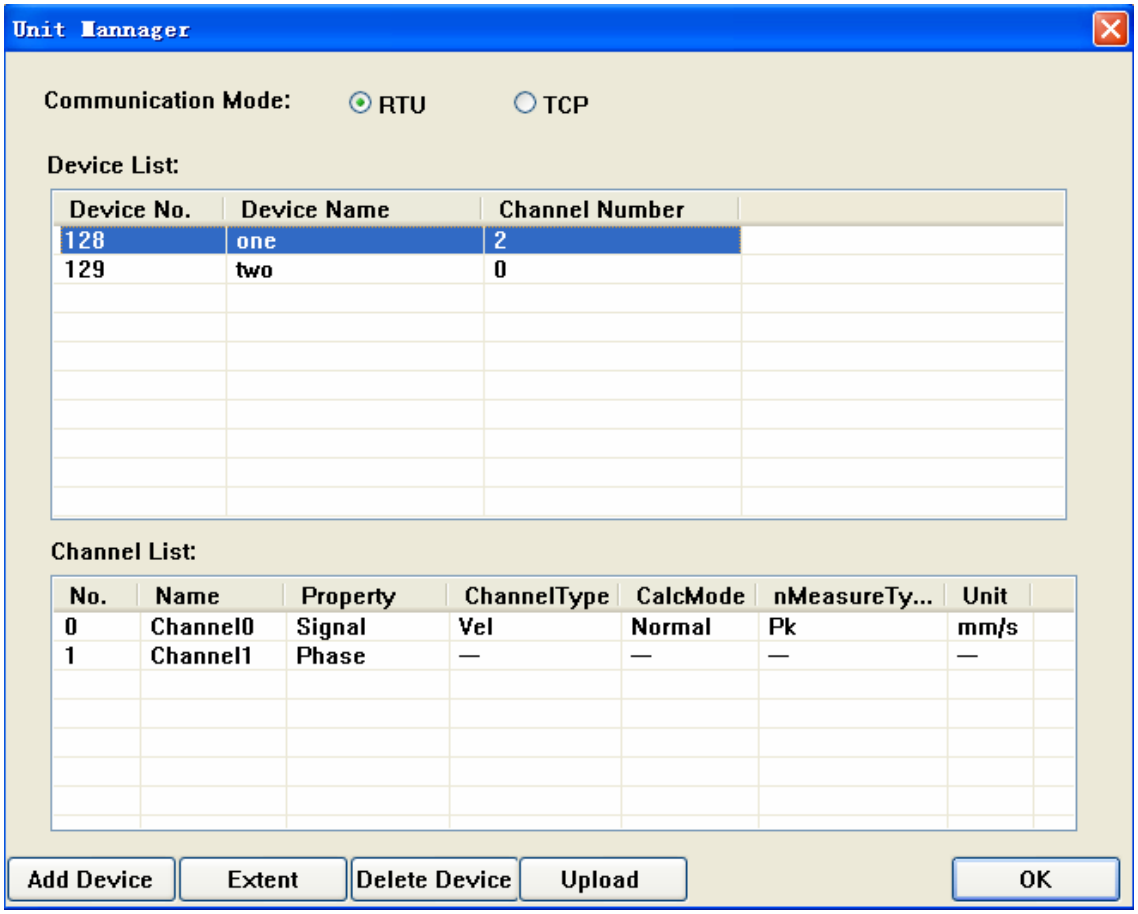
Click the button named ‘Add Device’,，the ’Device Information’ window will popup as follows:



The device numbers for the units will auto arrange and cannot be reassigned, but you can name the unit as your will. Click the button ‘OK’, the unit will be added to the Device List one by one.



Select one unit and click the button ‘Extent’, refer pre part for the RTU device or the TCP Client device to setup the commutation parameter for every unit. Select one unit and click the button name ‘Delete Device’, the unit will be deleted. Select one unit and click the button ‘Upload’ to upload the parameter of the unit, the parameter will show in the list at bottom of the window.


Unit Mannager
Communication Mode:
RTU
TCP
Device List:
Device No.
Device Name
Channel Number
128
one
2
129
two
0
Channel List:
No.
Name
Property
ChannelType
CalcMode
nMeasureTy...
Unit
0
Channel0
Signal
Vel
Normal
Pk
mm/s
1
Channel1
Phase
—
—
—
—
Add Device
Extent
Delete Device
Upload
OK

PCM360 System Maintenance

Accessories

PCM360-SUP-AX-BXX

Extended technical support agreement

AX: Additional years

X = Number of additional years with the agreement

BXX: Machines

XX = Number of machines

PT360-SC-AX-BX

Signal conditioning module that directly interfaces and powers with accelerometers, velocity sensors or proximity probes. No monitor is required.

AX: Number of dynamic channels

A0: 16

A1: 32

BX: Power supply

B0: 230VAC

B1: 110VAC

PCM-SERV

Pre-configured server which is configured with PCM360 software and Microsoft® SQL Server (software is purchased separately).

PCM-DPC

Pre-configured workstation computer with PCM360 software (software is purchased separately).

PCM-LPC

Pre-configured laptop/notebook computer with PCM360 software (software is purchased separately).

PCM-485

RS485 module on PCI slot.

PCM-SQL

Microsoft® SQL Server 2008 WorkGroup Edition.

PCM-GP

General purpose interface kit that includes PT360-DAQ cable and converter box.

PCM-SMS

SMS cellular phone message transmission and receiving hardware module. This module works with any GSM system.

PCM-PT2060-XXX

PT2060 and PT360-DAQ interconnection cable

XXX: Cable length in meters

PT2060/80-BK

Back panel of the data acquisition module on PT2060 Rack. Specially designed to directly interface with PT360-DAQ.

PT371

16 channels universal input module

PT372

4-20mA, 4 channels output module

PT373

Relay alarm module, 16 channels

Troubleshooting

Display Module Fails to Acquire Real-time Data

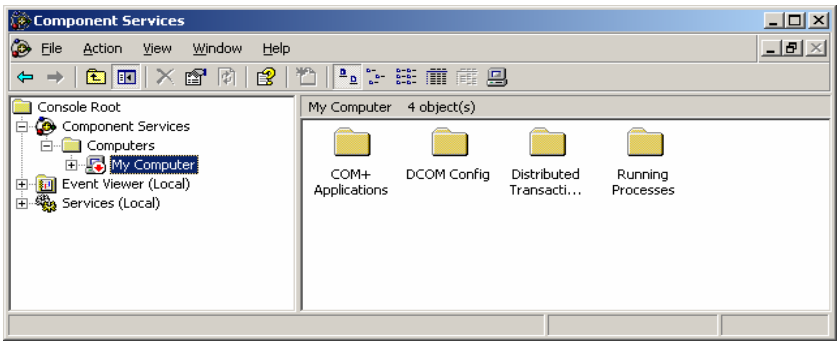
If Display Terminal can't acquire the real-time data from other PCM360 DAQ Servers in the same PCM360 system, please first check the following:

- The network communication. Ensure the network is good.
- System configuration. Ensure system configuration is correct.

If the two options above can be eliminated, then you should check the system UDP Port. Probably the current system UDP Port is being used by other application program. To change the system UDP Port, please refer to ***PCM360 SYSTEM MAINTENANCE/Troubleshooting/UDP Port Is Being Used***.

Fail to Launch "My Computer Property" Window when Configuring OPC System-Wide DCOM

Error Description: The error may occur when you configure the **System-Wide DCOM** settings on OPC Server and OPC Client. On "Component Services" window (see picture shown below), rest the mouse pointer on "My Computer" node inside "Computers" folder and you will find it is marked with a red-light icon. Right click "My Computer" and there is no **Property** shortcut command appeared in the shortcut menu.



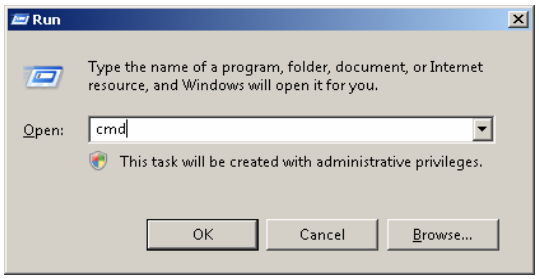
Solution: Open **Services (Local)** folder on the "Component Services" window and find the following three services.

- ✓ Distributed Transaction Coordinator
- ✓ Remote Procedure Call (RPC)
- ✓ Security Accounts Manager

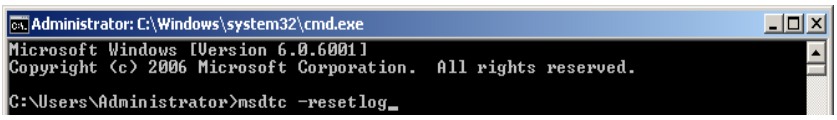
Ensure the three services are started and "Startup Type" feature of the three services are set to "Automatic".

CAUTION: If the "Distributed Transaction Coordinator" service can't be normally started for some unpredictable reason, try **Method 1** mentioned below first; if the service can't be started yet, try **Method 2**.

- ***Method 1:*** Click Windows **Start**->**Run** menu. On "Run" window below, type "cmd" and click **OK** button.

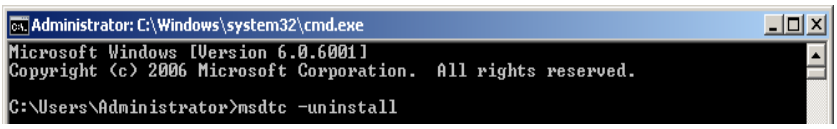

Run
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:
cmd
This task will be created with administrative privileges.
OK
Cancel
Browse...

On the "cmd.exe" window, type "**msdtc –resetlog**", and press **Enter** on keyboard, and then exit the window.

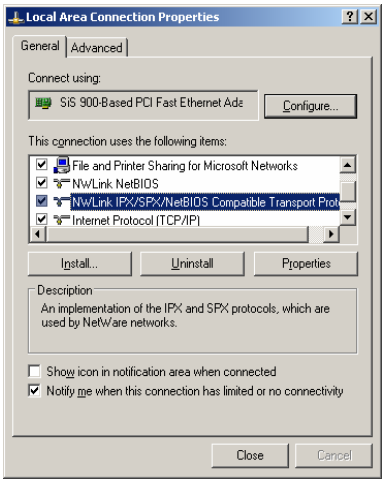

Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation. All rights reserved.
C:\Users\Administrator>msdtc -resetlog

Later re-start "Distributed Transaction Coordinator" service. If it can't be started yet, try **Method 2**.

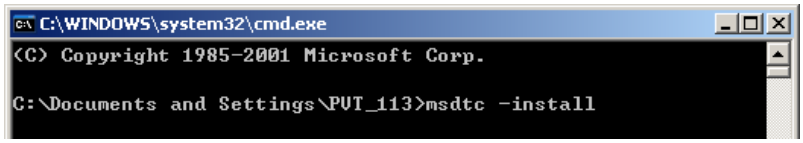
- ***Method 2:*** Click Windows **Start**->**Run** menu. On "Run" window below, type "cmd" and click **OK** button. On the "cmd.exe" window, type "**msdtc -uninstall**", and press **Enter** on keyboard, and then exit the window.


Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.0.6001]
Copyright (c) 2006 Microsoft Corporation. All rights reserved.
C:\Users\Administrator>msdtc -uninstall

Then open "Local Area Connection Properties" window. Please check whether "NWLink IPX/SPX/NetBIOS Compatible Transport Protocol" was installed. If it was installed, uninstall it and then re-start the computer.



Later open the “cmd.exe” window again. Type the “**msdtc -install**”, and press **Enter** on keyboard, and then exit the window.

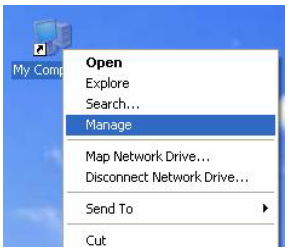


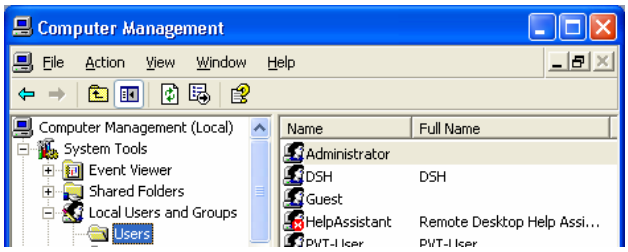
Finally re-start the “Distribute Transaction Coordinator” service.

Fail to Log on the Computer by Windows Administrator Account

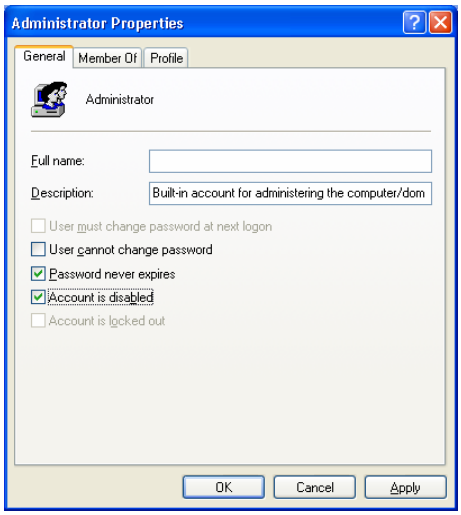
To install MS SQL Server 2008 WorkGroup Edition, you should log on the computer by Windows ***Administrator*** account. If you can’t log on the computer by this account, please try the method mentioned below:

1. Log on the computer by other account.
2. Right click “My Computer” on the Desktop and select **Manage** from the shortcut menu.





3. On “Computer Management” window (see picture above), select **Computer Management (Local)**->**System Tools**->**Local Users and Groups**->**Users**.
4. From the right panel, double click “Administrator” item and the “Administrator Properties” window is launched. On **General** tab, deselect “Account is disabled” and click **OK** button.

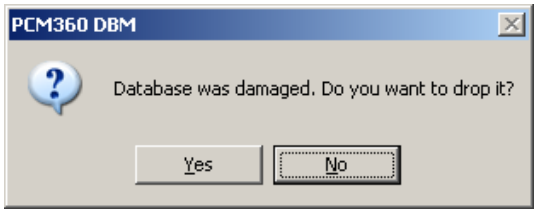


Finally log off the computer and select “Switch User” to re-log on it by Windows ***Administrator*** account.



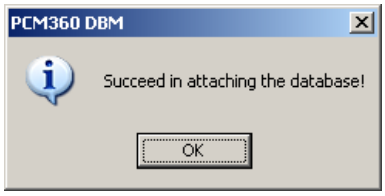
Fail to Log on DBM Software

When you log on the DBM software, following message box is launched:



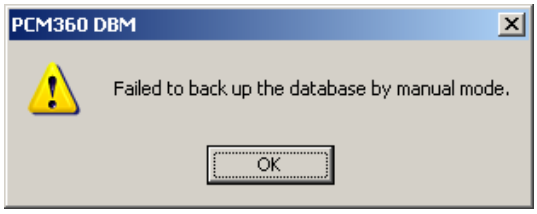
That indicates current database was damaged.

Solution: Click **Yes** button to drop the database, and then click **Attach** button on “Database Manager” window. If succeed in attaching database, software will launch following message box.



If software failed to attach the database, you should contact your local ProvibTech representative.

Fail to Backup Database



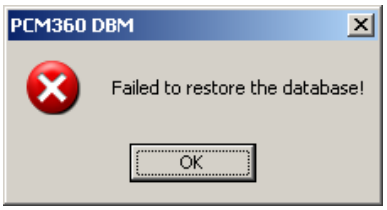
If the message box above is launched when software is backing up the database, please check:

1. SQL Server is running normally.

2. Disk space for saving backup record is available. Make sure the disk available space is at least three times the size of the backup record.

If still cannot backup the database, please contact your local ProvibTech representative.

Fail to Restore Database



If the message box above is launched when software is restoring the database, please check:

1. SQL Server is running normally.
2. The related backup record is produced by DBM software.
3. The related disk available space is at least three times the size of the backup record.

If still cannot restore the database, please contact your local ProvibTech representative.

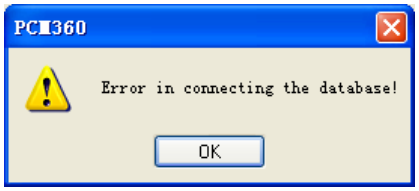
DB File Isn't Compatible with PCM360 Software

If the version of the current DB file is not supported by the PCM360 software, a message box will be launched to inform you when log on the software.

Solution: Uninstall the DBM&Server software and re-install it; or replace the DB file under the "DB" folder of the destination path.

Error in Connecting to Database

If system failed to connect to the database, message box below will be launched.



Please check the following:

- **The network condition is not stable.**

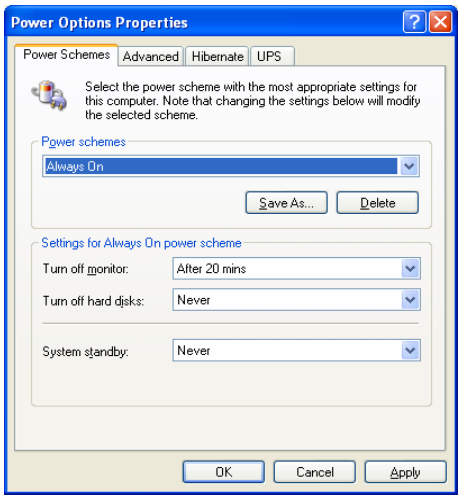
Reconnect the network cable and restart PCM360 system.

- **The DAQ&COM software or Display software has connected to a wrong DB Server.**

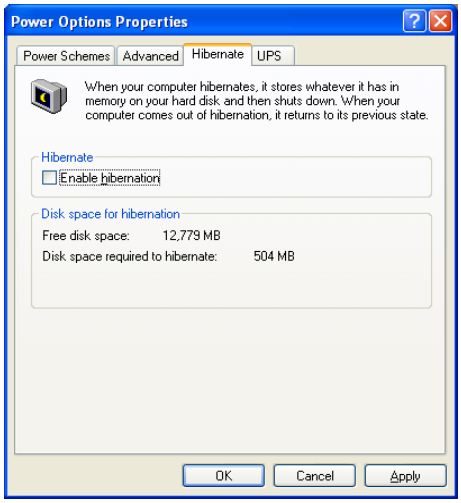
Check it on software's "Logging On" window.

- **The DB Server is powered off or the DB Server is hibernating.**

You must keep the DB Server always on. Follow the instructions to set the computer power properties. Open "Control Panel" and double click "Power Options". "Power Options Properties" window is launched. On **Power Schemes** tab, set "Power schemes" to "Always On"; set "Turn off hard disks" to "Never"; set "System standby" to "Never".



And then switch to **Hibernate** tab, de-select "Enable hibernation" check box.

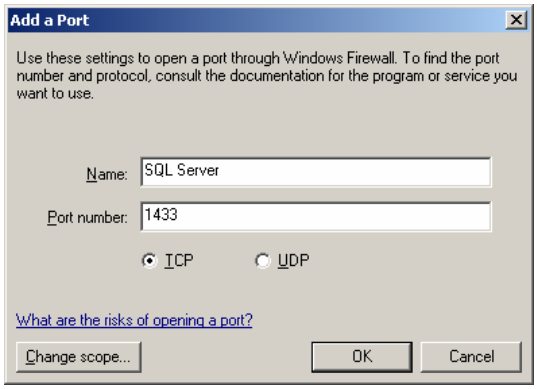

Power Options Properties
Power Schemes
Advanced
Hibernate
UPS
When your computer hibernates, it stores whatever it has in memory on your hard disk and then shuts down. When your computer comes out of hibernation, it returns to its previous state.
Hibernate
Enable hibernation
Disk space for hibernation
Free disk space: 12,779 MB
Disk space required to hibernate: 504 MB
OK
Cancel
Apply

Finally, click **OK** button to apply all settings.

- **The Windows Firewall is on.**

You could directly turn off the Windows Firewall to solve the problem. And if you want to keep the Windows Firewall on, you should follow instructions below:

1. Open “Control Panel” and click “Windows Firewall”.
2. On **Exception** tab of “Windows Firewall” window, click **Add Port** button.

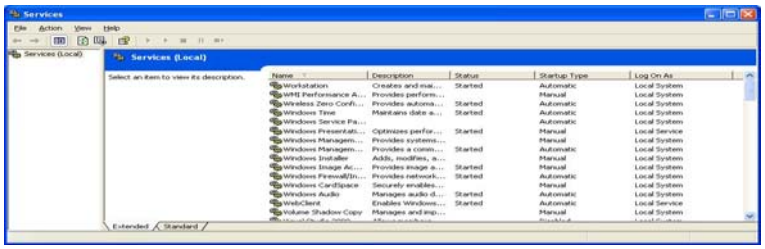

Add a Port
Use these settings to open a port through Windows Firewall. To find the port number and protocol, consult the documentation for the program or service you want to use.
Name:
SQL Server
Port number:
1433
TCP
UDP
What are the risks of opening a port?
Change scope...
OK
Cancel

Name the port as “SQL Server” and type **1433** in “Port number” edit box. And then select **TCP** option.

- **You have changed the Windows account information for SQL Server service, and meanwhile the PCM360 system uses MS SQL Server 2008 WorkGroup Edition software.**

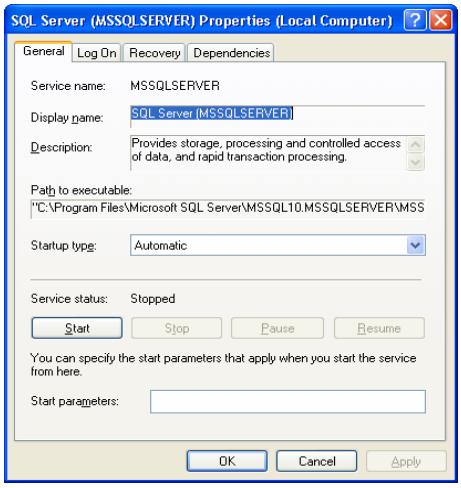
Take Windows XP operating system as an example and try the following:

1. Open “Control Panel”; double click “Administrator Tools”; On “Administrator Tools” window, double click **Services** shortcut.

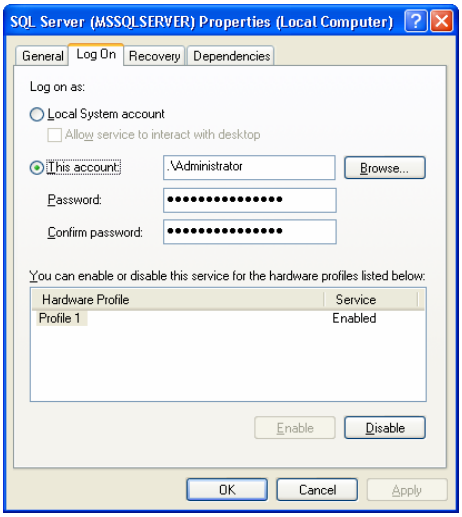


2. On right panel of the “Services” window, find the following five services options:
   - ✓ SQL Server (MSSQLSERVER)
   - ✓ SQL Server Agent (MSSQLSERVER)
   - ✓ SQL Server Analysis Services (MSSQLSERVER)
   - ✓ SQL Server Integration Services 10.0
   - ✓ SQL Server Reporting Services (MSSQLSERVER)

   Set the five services: Take “SQL Server (MSSQLSERVER)” as an example. Double click this option and following window appears.



Switch to **Log On** tab; mark “This account” if the current setting is “Local System account”. Ensure the logon setting is set the same as the current Windows logon account information.



Later, click **OK** button to apply all settings. Then consult the instruction above to set other four services.

Tree View on Display Module Can’t Work Normally (Unpredictable Error Happens)

Check the following options:

- If Display software wasn’t installed on DB Server and meanwhile your Display Terminal runs on Windows 2000 operating system or Windows XP operation system with version former than SP2, you should install MDAC, version 2.9.1 or later on Display Terminal. Please visit *Microsoft Website* to download the most recent version of MDAC.

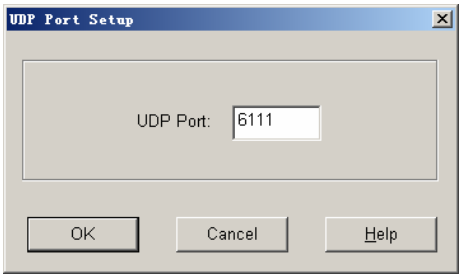
- If Display software wasn't installed on DB Server and meanwhile your Display Terminal runs on Windows Vista operating system, please visit *Microsoft Website* to download the most recent version of Service Pack package and then upgrade the current operating system.

UDP Port Is Being Used

If the system UDP port is being used by other application program when log on PCM360 software, following message box will be launched.



Under this condition, please log on software first and stop the system, and then select **UDP Port Setup** command from **Setup** menu.



Type an available UDP port and then click **OK** button.

CAUTION: To apply the new UDP port, after re-set the system UDP port, you must exit PCM360 software (contains DAQ&COM, Display, Server, and Web Server) on all PCM360 Terminals, and then re-run them.

"Error" Window Is Launched



If the "Error" window shown like above is launched, please check the following:

1. The Server software is running normally.
2. The Softdog is indeed plugged on the DB Server.

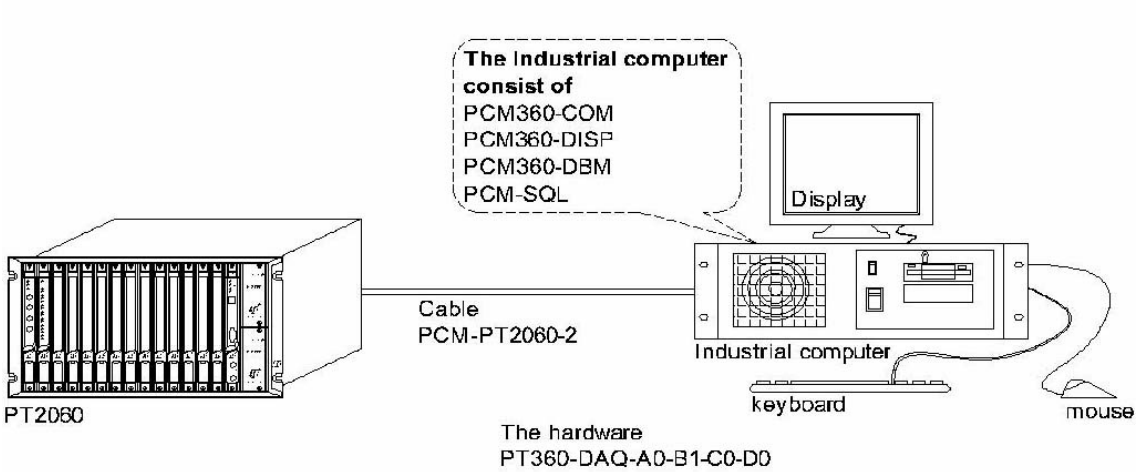
PCM360 Application Notes

PCM360 Minimum System Configuration

For example, the PCM360 minimum system is configured to interface with the PT2060 monitor.

The system consists of:

- ✓ PCM360-COM-A0 communication and data acquisition module
- ✓ PCM360-DISP-A0 display and analysis module. Computers are equipped with Microsoft Windows XP professional or higher operational system
- ✓ PCM360-DBM-A0 database management
- ✓ PCM360-LIS-A01-B01-C1-D1-E0-F1 user options and licenses module
- ✓ PT360-DAQ-A0-B1-C0-D0 data acquisition system (hardware)



The minimum system

It is a 12 channel system. The entire system, with hardware and software, has been put into an industrial computer. This system will perform data acquisition with process data and dynamic data. The system is ideal for plant operators, maintenance engineers, and managers that perform general data analysis and maintenance.

The features of the system include:

- ✓ Integral system with one industrial computer
- ✓ Single user
- ✓ 12 dynamic channels, 2 phase reference channels
- ✓ Directly interfaces with PT2060 monitor

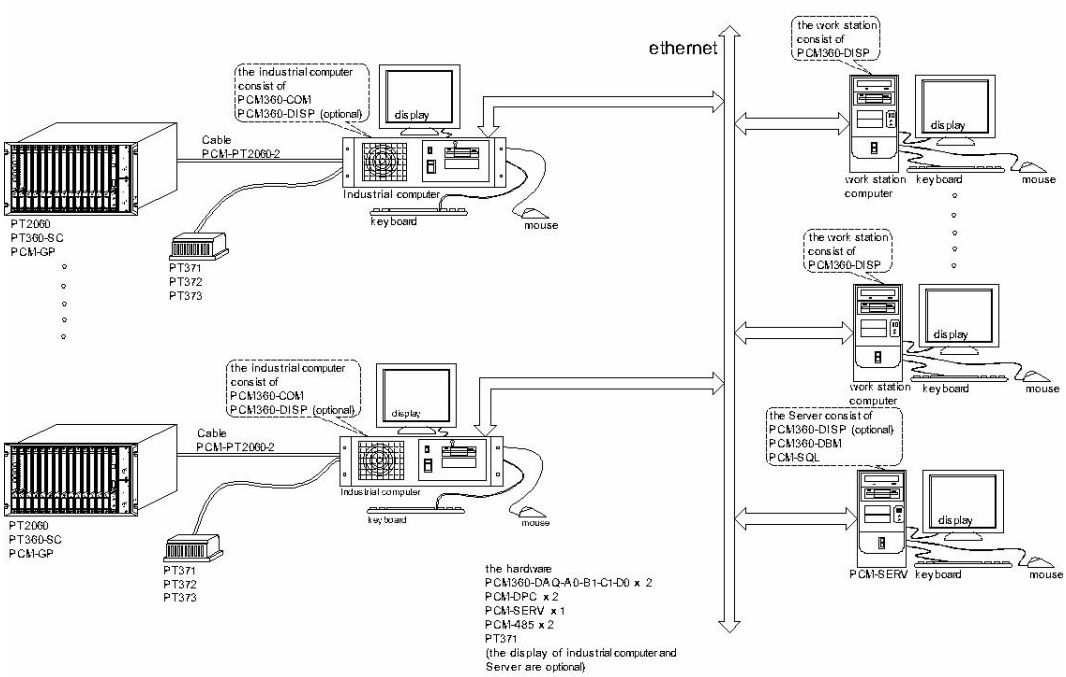
- ✓ Microsoft® SQL Server 2008 WorkGroup Edition software
- ✓ Capable of collecting, analyzing and storing dynamic data

Since PCM360 is a modular system, the system can easily expand into a standard plant-wide condition management system; additional features can be realized by adding more modules.

- ✓ Transient data collection and analysis
- ✓ Up to 128 users access
- ✓ Up to 24 PT360-DAQ
- ✓ Up to 240 Modbus RTU devices
- ✓ Dedicated server computer
- ✓ High frequency data acquisition
- ✓ Hardware output of programmed alarms and 4-20mA
- ✓ Remote access to the system with CitrixTM server
- ✓ Interface with any third company process data and dynamic data
- ✓ Onsite technical service and training

PCM360 Standard Network System Configuration

Example: A plant has 10 machine trains. Each machine train includes a compressor and an electrical motor. The compressor has four proximity probes to measure shaft X, Y vibration; one proximity probe to measure thrust position and one proximity probe to measure phase reference. The motor has four channels of case mounted accelerometers to measure case vibration. Five PT2060 monitors are mounted in the control room. Each PT2060 can monitor two machine trains with 18 dynamic channels and 2 phase reference channels.



standard network system

There will be five data acquisition units; assume the plant has 10 users.

Recommendation: the standard PCM360 system with the following modules:

- ✓ PCM360-COM-A0 x 1: Communication and data acquisition module
- ✓ PCM360-DISP-A0 x 1: Display and analysis module
- ✓ PCM360-DBM-A0 x 1: Database management
- ✓ PCM360-MODBUS-A0 x 1: Modbus RTU communication module
- ✓ PCM360-LIS-A05-B10-C0-E1-F1 x 1: User option and license module
- ✓ PT360-DAQ-A1-B1-C1-D1 x 5: Five data acquisition systems (hardware)
- ✓ PCM-SERV x 1: Server computer equipped with Windows 2003 server operation system
- ✓ PCM-SQL x 1: Microsoft® SQL Server 2008 WorkGroup Edition software
- ✓ PCM-DPC x 10: Workstations running DISP software module
- ✓ PCM360-SUP-A5-B10 x 1: Five year technical support plan for 10 machines

PCM360 Connection to PT2060 Monitor

The PCM360 directly interfaces with the PT2060 monitor. Each PT2060 can hold a maximum of 48 channels (with condition monitoring modules).

The 4th slot from the right output dynamic signal of channel 1 to 24. The 3rd output channel 25 to 48. On each of the PT2060/80-BK modules, there are two multi-pin connectors, the top connector output data of channel 1 to 12 (25 to 36) with dual phase references. The bottom connector output data of channel 13 to 24 (37 to 48) with dual phase references.

PT360-DAQ can be mounted next to PT2060 monitor to form a complete protection and data acquisition system.

PCM360 Connection with Modbus Devices or Any Process Data Monitors

Modbus RTU communication is available with PCM360. Each system can hold a maximum of 240 Modbus devices.

For a large system, we recommend obtaining static and process data through Modbus communication. This will save many dynamic data acquisition channels on both hardware and software.

PT371 can be used to collect process data from any third-party monitors. A PCM-485 is required for this configuration.

PCM360 Connection Direct To Sensors

Optional rack mount hardware PT360-SC is required to connect sensors directly without monitors. Each PT360-SC can hold 16 or 32 channels (including phase reference channels). This signal conditioner can directly drive current mode accelerometers and velocity sensors.

PCM360 Hardware Output of Programmed Relay Alarms and 4-20mA

This is a unique feature of PCM360. PT373 can be programmed with PLC similar logic to drive the dry contact relays. PT372 will output up to four channels of 4-20mA signals.

Appendix

Appendix I. Installing MS SQL Server 2000 Personal Edition

MS SQL Server must be installed on DB Server. Follow the steps below to install MS SQL Server 2000 Personal Edition.

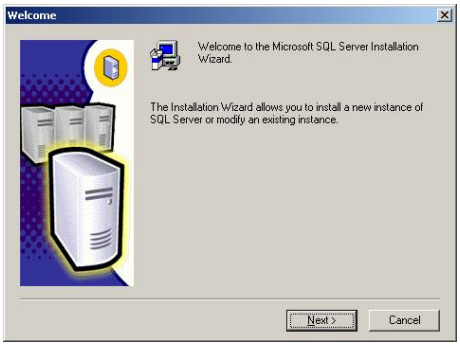
1. Put the **SQL Server 2000 Personal Edition CD** into the DVD-ROM. It should be normally automatically detected, or else select the drive and run the **Setup.exe** file.
2. Select “SQL Server 2000 Components”.



3. Select “Install Database Server”.



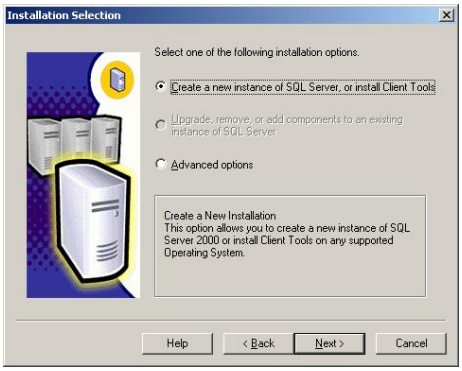
4. The Setup will launch “Welcome” window. Click **Next** button.


Welcome
Welcome to the Microsoft SQL Server Installation Wizard.
The Installation Wizard allows you to install a new instance of SQL Server or modify an existing instance.
Next >
Cancel

5. Select “Local Computer”.

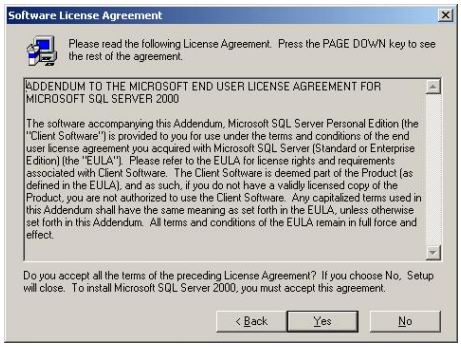

Computer Name
Enter the name of the computer on which you want to create a new instance of SQL Server or modify an existing instance of SQL Server.
Or, enter the name of a new or existing Virtual SQL Server to manage.
SOFTWARE
Local Computer
Remote Computer
Virtual Server
Browse...
Help
< Back
Next >
Cancel

6. Select “Create a new instance of SQL Server, or install Client Tools”.


Installation Selection
Select one of the following installation options.
Create a new instance of SQL Server, or install Client Tools
Upgrade, remove, or add components to an existing instance of SQL Server
Advanced options
Create a New Installation
This option allows you to create a new instance of SQL Server 2000 or install Client Tools on any supported Operating System.
Help
< Back
Next >
Cancel

7. Enter your name and your company name. Click **Next** button to continue.

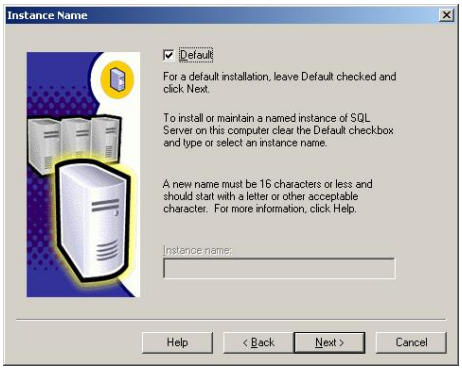
8. The Setup will launch “Software License Agreement” window. Click **Yes** button.


Software License Agreement
Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement.
ADDENDUM TO THE MICROSOFT END USER LICENSE AGREEMENT FOR MICROSOFT SQL SERVER 2000
The software accompanying this Addendum, Microsoft SQL Server Personal Edition (the "Client Software") is provided to you for use under the terms and conditions of the end user license agreement you acquired with Microsoft SQL Server (Standard or Enterprise Edition) (the "EULA"). Please refer to the EULA for license rights and requirements associated with Client Software. The Client Software is deemed part of the Product (as defined in the EULA), and as such, if you do not have a validly licensed copy of the Product, you are not authorized to use the Client Software. Any capitalized terms used in this Addendum shall have the same meaning as set forth in the EULA, unless otherwise set forth in this Addendum. All terms and conditions of the EULA remain in full force and effect.
Do you accept all the terms of the preceding License Agreement? If you choose No, Setup will close. To install Microsoft SQL Server 2000, you must accept this agreement.
< Back
Yes
No

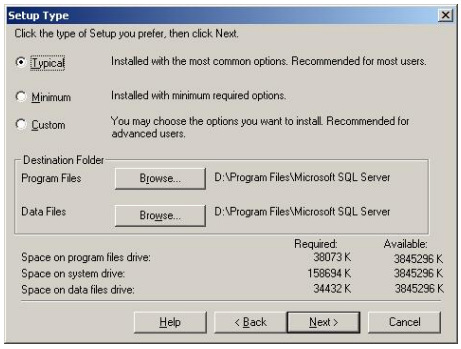
9. Select “Server and Client Tools”. And click **Next** button.


Installation Definition
You can select one of the following types of installations.
Client Tools Only
Server and Client Tools
Connectivity Only
This option allows you to install a server and the client tools. Use this option if you want to set up a server with administration capabilities.
Help
< Back
Next >
Cancel

10. Mark “Default” and click **Next** button.


Instance Name
Default
For a default installation, leave Default checked and click Next.
To install or maintain a named instance of SQL Server on this computer clear the Default checkbox and type or select an instance name.
A new name must be 16 characters or less and should start with a letter or other acceptable character. For more information, click Help.
Instance name:
Help
< Back
Next >
Cancel

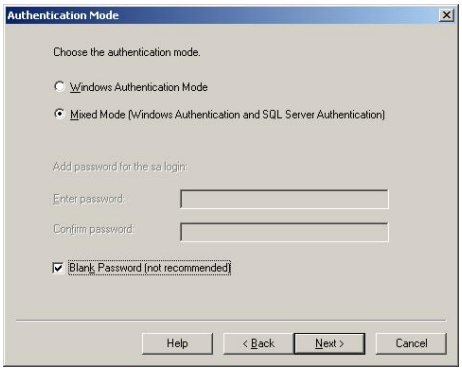
11. Select “Typical” and click **Next** button.



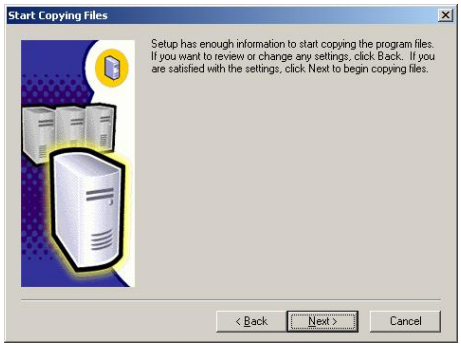
12. Select “Use the same account for each service. Auto start SQL Server Service”. And select “Use the Local System account” in Service Settings. Click **Next** button.



13. Select “Mixed Mode (Windows Authentication and SQL Server Authentication)”, and mark “Blank Password (not recommended)”. Click **Next** button.

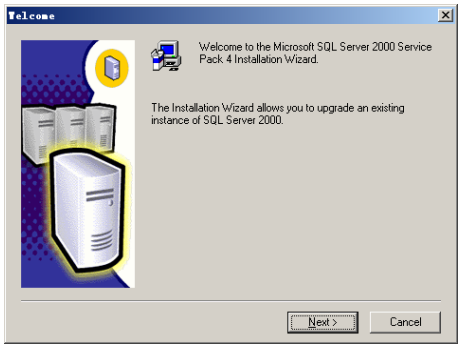


14. The Setup will launch “Start Copying Files” window. Click **Next** button.

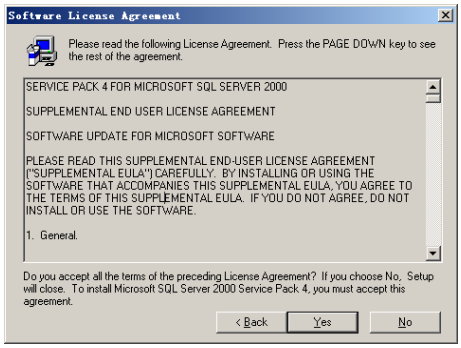

Start Copying Files
Setup has enough information to start copying the program files. If you want to review or change any settings, click Back. If you are satisfied with the settings, click Next to begin copying files.
< Back
Next >
Cancel

15. **Restart the computer!**

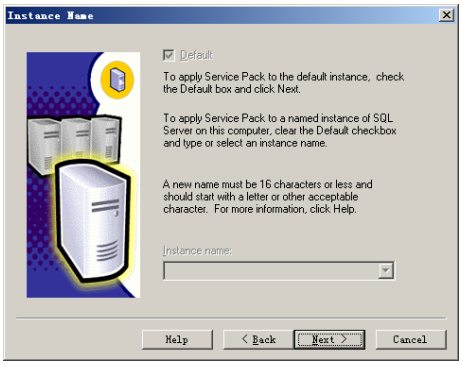
16. Insert **Standard Edition Service Pack 4 Installation CD** into DVD-ROM and install it. Click **Next** button.


Welcome
Welcome to the Microsoft SQL Server 2000 Service Pack 4 Installation Wizard.
The Installation Wizard allows you to upgrade an existing instance of SQL Server 2000.
Next >
Cancel

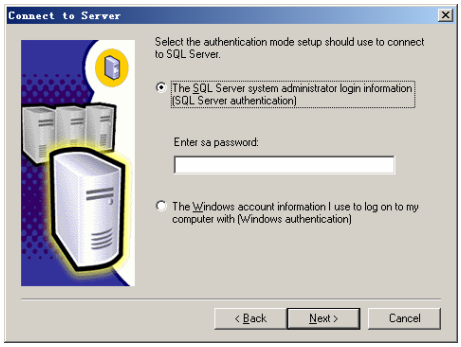
Click **Yes** button.


Software License Agreement
Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement.
SERVICE PACK 4 FOR MICROSOFT SQL SERVER 2000
SUPPLEMENTAL END USER LICENSE AGREEMENT
SOFTWARE UPDATE FOR MICROSOFT SOFTWARE
PLEASE READ THIS SUPPLEMENTAL END-USER LICENSE AGREEMENT ("SUPPLEMENTAL EULA") CAREFULLY. BY INSTALLING OR USING THE SOFTWARE THAT ACCOMPANIES THIS SUPPLEMENTAL EULA, YOU AGREE TO THE TERMS OF THIS SUPPLEMENTAL EULA. IF YOU DO NOT AGREE, DO NOT INSTALL OR USE THE SOFTWARE.
1. General.
Do you accept all the terms of the preceding License Agreement? If you choose No, Setup will close. To install Microsoft SQL Server 2000 Service Pack 4, you must accept this agreement.
< Back
Yes
No

Click **Next** button.


Instance Name
Default
To apply Service Pack to the default instance, check the Default box and click Next.
To apply Service Pack to a named instance of SQL Server on this computer, clear the Default checkbox and type or select an instance name.
A new name must be 16 characters or less and should start with a letter or other acceptable character. For more information, click Help.
Instance name:
Help
< Back
Next >
Cancel

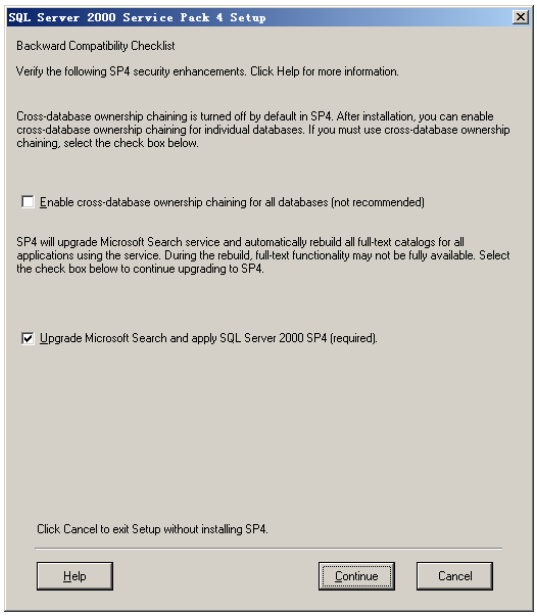
Select “The SQL Server system administrator login information (SQL Server authentication)” and leave the “Enter sa password” field blank. And then click **Next** button.


Connect to Server
Select the authentication mode setup should use to connect to SQL Server.
The SQL Server system administrator login information (SQL Server authentication)
Enter sa password:
The Windows account information I use to log on to my computer with (Windows authentication)
< Back
Next >
Cancel

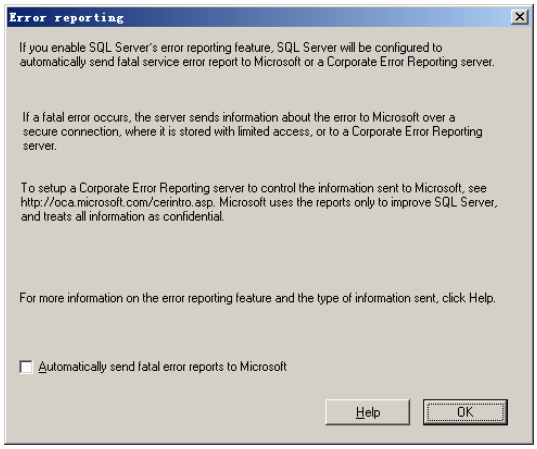
The Setup will launch the window below: Select “Ignore the security threat warning, leave the password blank” and then click **OK** button.


SA Password Warning
Service pack setup has detected that your SA password is set to blank. It is highly recommended that you set a strong password and secure your database server, even if you are using Windows authentication.
I do not want a blank password, set password :
Enter SA Password:
Confirm SA Password:
Ignore the security threat warning, leave the password blank.
OK

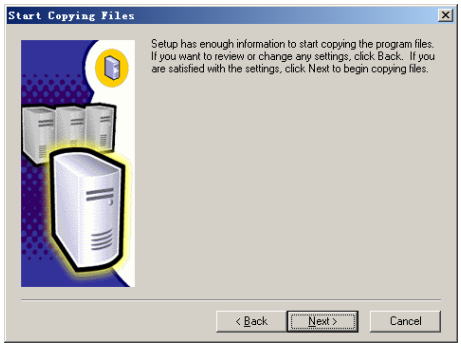
Mark “Upgrade Microsoft Search and apply SQL Server 2000 SP4 (required)” and then click **Continue** button.


SQL Server 2000 Service Pack 4 Setup
Backward Compatibility Checklist
Verify the following SP4 security enhancements. Click Help for more information.
Cross-database ownership chaining is turned off by default in SP4. After installation, you can enable cross-database ownership chaining for individual databases. If you must use cross-database ownership chaining, select the check box below.
Enable cross-database ownership chaining for all databases (not recommended)
SP4 will upgrade Microsoft Search service and automatically rebuild all full-text catalogs for all applications using the service. During the rebuild, full-text functionality may not be fully available. Select the check box below to continue upgrading to SP4.
Upgrade Microsoft Search and apply SQL Server 2000 SP4 (required).
Click Cancel to exit Setup without installing SP4.
Help
Continue
Cancel

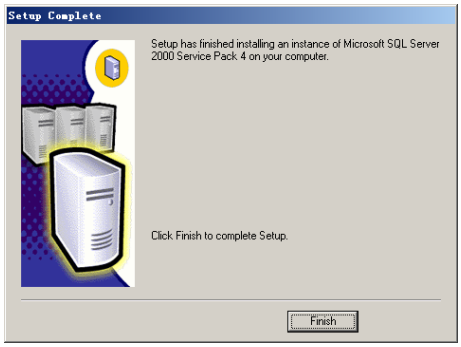
The Setup will launch “Error reporting” window, and later click **OK** button.


Error reporting
If you enable SQL Server's error reporting feature, SQL Server will be configured to automatically send fatal service error report to Microsoft or a Corporate Error Reporting server.
If a fatal error occurs, the server sends information about the error to Microsoft over a secure connection, where it is stored with limited access, or to a Corporate Error Reporting server.
To setup a Corporate Error Reporting server to control the information sent to Microsoft, see http://oca.microsoft.com/cerintro.asp. Microsoft uses the reports only to improve SQL Server, and treats all information as confidential.
For more information on the error reporting feature and the type of information sent, click Help.
Automatically send fatal error reports to Microsoft
Help
OK

Click **Next** button.


Start Copying Files
Setup has enough information to start copying the program files. If you want to review or change any settings, click Back. If you are satisfied with the settings, click Next to begin copying files.
< Back
Next >
Cancel

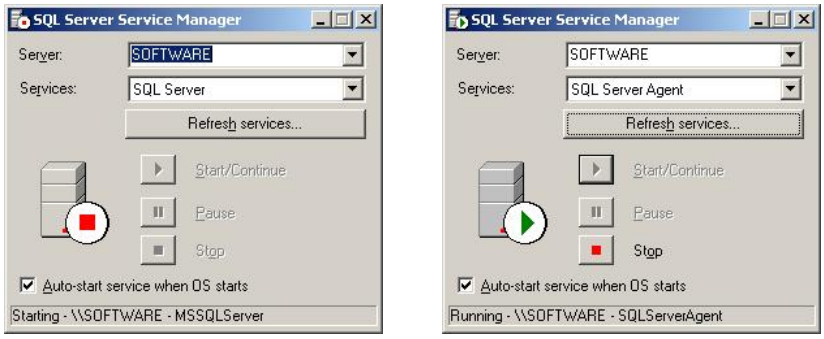
Click **Finish** button.


Setup Complete
Setup has finished installing an instance of Microsoft SQL Server 2000 Service Pack 4 on your computer.
Click Finish to complete Setup.
Finish

17. **Restart your computer again!**

18. Select Windows **Start**->**All Programs**->**Microsoft SQL Server**->**Service Manager**. Make sure SQL Server and SQL Server Agent Services are started.

    - Select “SQL Server” from Services field and click **Start/Continue** button to start it. And mark “Auto-start service when OS starts”.



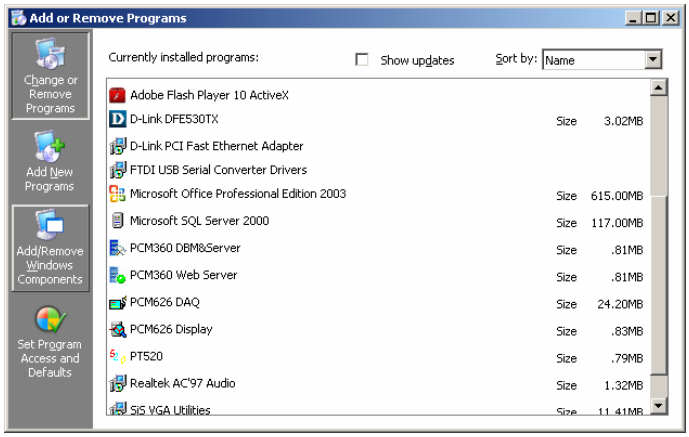
- Select “SQL Server Agent” from Services field and click **Start/Continue** button to start it. And mark “Auto-start service when OS starts”.

Appendix II. Installing Microsoft IIS

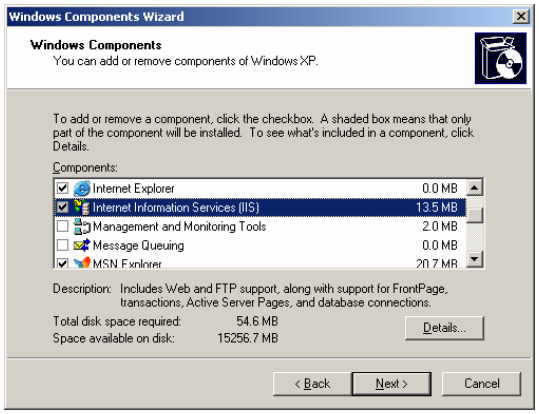
Internet Information Server (IIS) provides a manageable and scalable Web application infrastructure for all versions of Windows Server 2003. Before install Web Server software, ensure you have installed IIS on the computer.

Follow the steps below to install it:

1. Put the Operating System Installation Media into the DVD-ROM.
2. Select Windows **Start**->**Control Panel** command and then double click **Add/Remove Programs**. The "Add/Remove Programs" window will appear. Click **Add/Remove Windows Components** command on the window.



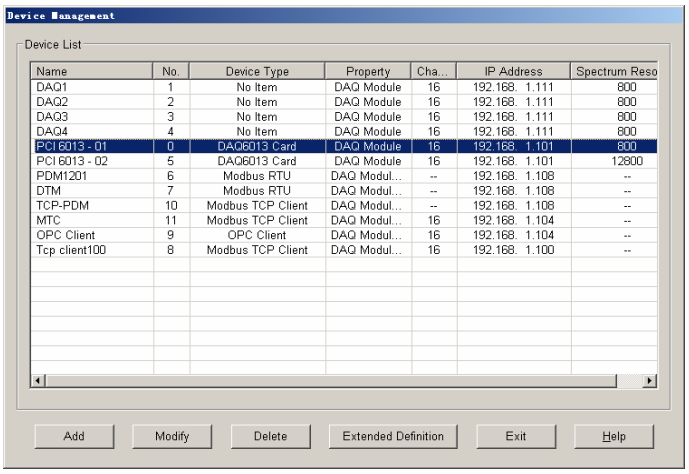
3. The "Windows Components Wizard" window will appear. Notice that, if you are using Windows 2003 Server, you need to highlight **Application Server** and then click **Details** to display the Windows Components Wizard. Check the box labeled **Internet Information Services (IIS)** and then click **Next** button. IIS will be installed on your system.


Windows Components Wizard
Windows Components
You can add or remove components of Windows XP.
To add or remove a component, click the checkbox. A shaded box means that only part of the component will be installed. To see what's included in a component, click Details.
Components:
Internet Explorer 0.0 MB
Internet Information Services (IIS) 13.5 MB
Management and Monitoring Tools 2.0 MB
Message Queuing 0.0 MB
MSN Explorer 20.7 MB
Description: Includes Web and FTP support, along with support for FrontPage, transactions, Active Server Pages, and database connections.
Total disk space required: 54.6 MB
Space available on disk: 15256.7 MB
Details...
< Back
Next >
Cancel

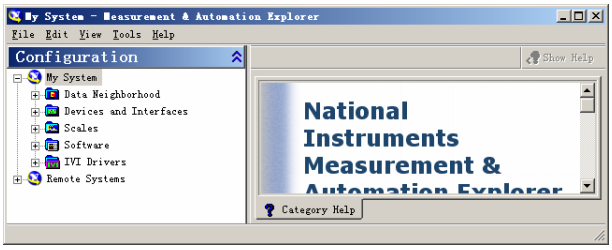
Appendix III. How to Map Hardware DAQ Cards and Virtual DAQ Cards

Following contents show how to map hardware DAQ cards (installed on local DAQ Server) to virtual DAQ cards (added by DAQ&COM software on local DAQ Server).

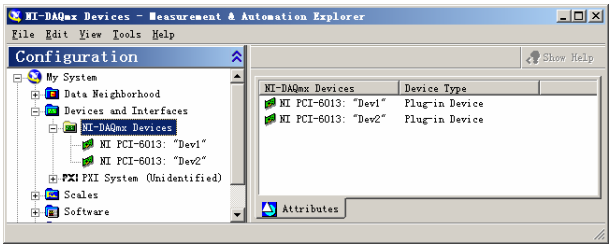
See picture below: On “Device Management” window, two DAQ6013 cards (PCI6013-01 and PCI6013-02) are added on local DAQ Server (IP address is “192.168.1.101”). The devices No. are 0 and 5.


Device Management
Device List
Name | No. | Device Type | Property | Cha... | IP Address | Spectrum Reso
DAQ1 | 1 | No Item | DAQ Module | 16 | 192.168. 1.111 | 800
DAQ2 | 2 | No Item | DAQ Module | 16 | 192.168. 1.111 | 800
DAQ3 | 3 | No Item | DAQ Module | 16 | 192.168. 1.111 | 800
DAQ4 | 4 | No Item | DAQ Module | 16 | 192.168. 1.111 | 800
PCI 6013 - 01 | 0 | DAQ6013 Card | DAQ Module | 16 | 192.168. 1.101 | 800
PCI 6013 - 02 | 5 | DAQ6013 Card | DAQ Module | 16 | 192.168. 1.101 | 12800
PDM1201 | 6 | Modbus RTU | DAQ Modul... | -- | 192.168. 1.108 | --
DTM | 7 | Modbus RTU | DAQ Modul... | -- | 192.168. 1.108 | --
TCP-PDM | 10 | Modbus TCP Client | DAQ Modul... | -- | 192.168. 1.108 | --
MTC | 11 | Modbus TCP Client | DAQ Modul... | 16 | 192.168. 1.104 | --
OPC Client | 9 | OPC Client | DAQ Modul... | 16 | 192.168. 1.104 | --
Tcp client100 | 8 | Modbus TCP Client | DAQ Modul... | 16 | 192.168. 1.100 | --
Add
Modify
Delete
Extended Definition
Exit
Help

Now select Windows **Start**->**All Programs**->**National Instruments**->**Measurement & Automation** menu. “My System-Measurement & Automation Explorer” window is launched.



From “Configuration” tree, expend “My System” and “Devices and Interfaces”, and click on “NI-DAQmx Devices”. See picture shown below:



Two items under the NI-DAQmx Devices node mark the hardware DAQ cards installed on local DAQ Server. They are **NI PCI-6013: "Dev1"** and **NI PCI-6013: "Dev2"**. Following table shows the relation between the hardware cards and virtual cards.

Hardware DAQ cards installed on the local DAQ Server	The mapped virtual cards added by DAQ&COM software on local DAQ Server
NI PCI-6220: "Dev1"	PCI6013-01 (device No. is 0)
NI PCI-6220: "Dev2"	PCI6013-02 (device No. is 5)

The relation indicates that hardware cards map the virtual cards by order of their device No. from small to large. That is to say, "Dev1" will map the virtual DAQ card with the smallest device No. (in all DAQ cards added in DAQ Server), and "Dev2" will map the virtual DAQ card with a larger device No., and so forth.

Appendix IV. Register Address for PT371

Device	Channel Property	Channel No.	Register Address
PT371	Input	Channel 0	30001
		Channel 1	30002
		Channel 2	30003
		Channel 3	30004
		Channel 4	30005
		Channel 5	30006
		Channel 6	30007
		Channel 7	30008
		Channel 8	30009
		Channel 9	30010
		Channel 10	30011
		Channel 11	30012
		Channel 12	30013
		Channel 13	30014
		Channel 14	30015
		Channel 15	30016

Appendix V. Register Address for PT372

Device	Channel Property	Channel No.	Register Address
PT372	4-20mA Output	Channel 0	40001
		Channel 1	40002
		Channel 2	40003
		Channel 3	40004
	Relay Output	Channel 0	1
		Channel 1	2
		Channel 2	3
		Channel 3	4
		Channel 4	5
		Channel 5	6
		Channel 6	7
		Channel 7	8

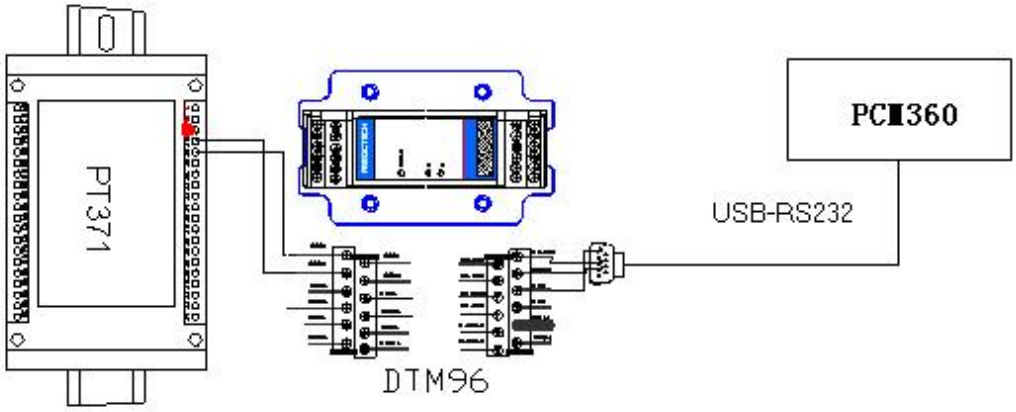
Appendix VI. Register Address for PT373

Device	Channel Property	Channel No.	Register Address
PT373	Relay Output	Channel 0	1
		Channel 1	2
		Channel 2	3
		Channel 3	4
		Channel 4	5
		Channel 5	6
		Channel 6	7
		Channel 7	8
		Channel 8	9
		Channel 9	10
		Channel 10	11
		Channel 11	12
		Channel 12	13
		Channel 13	14
		Channel 14	15
		Channel 15	16

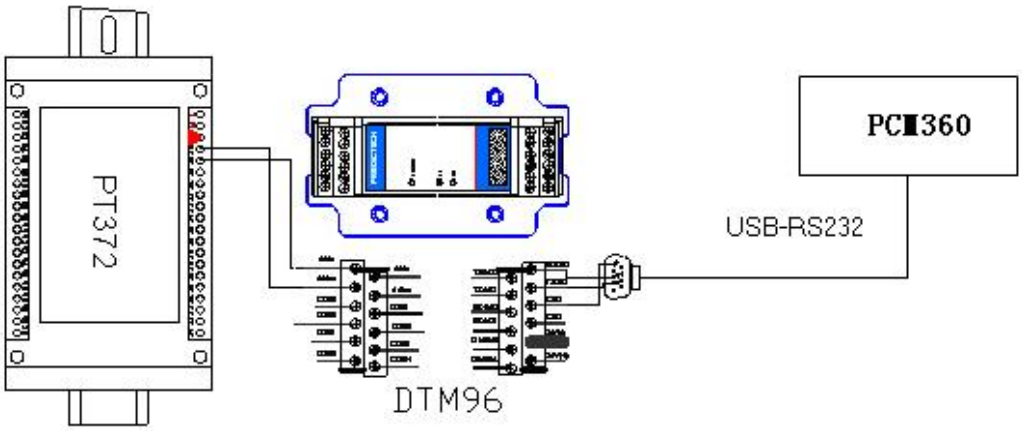
Appendix VII. Register Address for DTM, PT580, and DM200

Device	Channel Property	Channel No.	Register Address
DTM	Input	Channel 0	30501
PT580	Input	Channel 0	30501
DM200	Input	Channel 0	30501
		Channel 1	30503

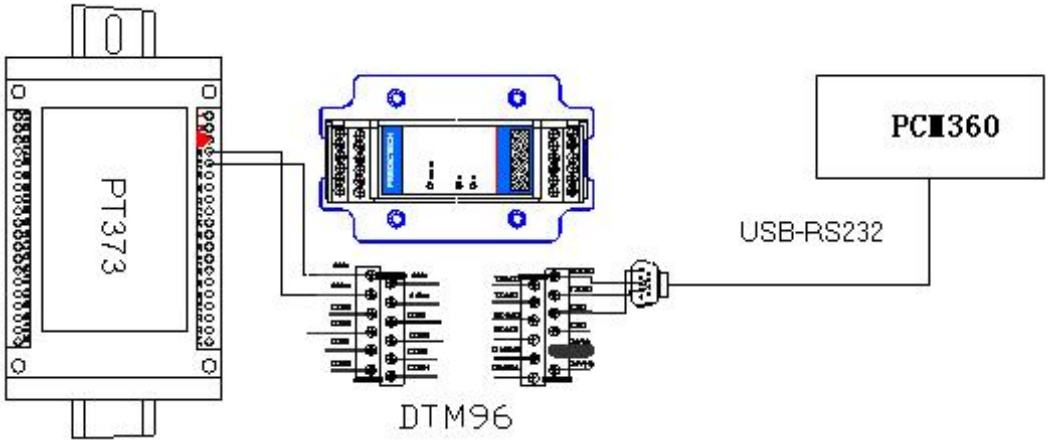
Appendix VIII. Field Wiring Diagram-PT371 with PCM360 via RS232



Appendix IX. Field Wiring Diagram-PT372 with PCM360 via RS232



Appendix X. Field Wiring Diagram-PT373 with PCM360 via RS232



Appendix XI. Glossary

*** Absolute Vibration**

Vibration of an object as measured relative to an inertial (fixed) reference frame. Acceleration transducers and velocity transducers measure absolute vibration typically of machine housings or structures; thus they are referred to as seismic transducers.

*** Acceleration**

The time rate of change of velocity. For harmonic motion, this is often expressed as g or a. Typical units for acceleration are feet per second per second (ft/s^2), meters per second per second (m/s^2), or more commonly "g" (where g = acceleration of earth's gravity = 386.1 in/s^2 = 32.17 ft/s^2 = 9.81 m/s^2). Acceleration measurements are generally made with piezoelectric accelerometers and are typically used to evaluate high frequency machine casing or bearing housing response characteristics.

*** Acceleration transducer**

An Acceleration transducer is a seismic transducer which converts the acceleration character of vibration into a proportional electric signal.

*** Aliasing**

False frequency components caused by sampling a dynamic signal at a sampling frequency too low. The sampling frequency must be at least twice of the highest frequency of interest or the highest frequency component in the signal. This effect can be eliminated by adjusting the sampling frequency, or using a low-pass filter on the signal prior to sampling

(anti-aliasing.) The primary disadvantage of anti-aliasing (as is the case with virtually any type of filtering) is that phase and amplitude errors would incur.

*** Alignment**

The positioning of machine components; bearings, rotors, casing, foundation, piping, etc., with respect to each other for efficient transfer of power. Various alignment requirements utilize different techniques of cold and hot machine measurement including optical, mechanical (dial indicators), electronic (proximity probes), and laser.

*** Amplitude**

The magnitude of periodic dynamic motion (vibration). Amplitude is typically expressed in terms of signal level, e.g., millivolts or milliamps, or the engineering units of the measured variable, e.g., mils, micrometers (for displacement), inches per second (for velocity), etc. The amplitude of a signal can be measured in terms of peak-to-peak, zero-to-peak, root mean square, or average.

*** Asynchronous or Non-synchronous**

Vibration frequency component which is different than shaft rotative speed. Sometimes used to mean any vibration frequency which is not an integer multiple or fraction of rotative frequency.

*** Attitude Angle**

The included angle between the direction of the vector sum of all the unidirectional, steady state, radial loads (Preloads) on a rotor and a line connecting the bearing and shaft centers. Sometimes confused with Rotor Position Angle, since the preload historically and incorrectly, was considered to be primarily gravity on horizontal machines.

*** Average**

An amplitude detection technique used for sine wave vibration signals; the half cycle average is 0.637 x zero-to-peak amplitude. Average amplitude detection is not used by ProvibTech because machinery vibration signals are most often non-sinusoidal in form and the peak-to-peak, or peak amplitude, cannot be correctly computed.

*** Average Shaft Position**

The static or average position of the shaft relative to a stationary component on the machine to which the probe is mounted. The most common application is rotor axial thrust position relative to the thrust bearing. Another important application is shaft average radial position in the bearing. These measurements are made using the dc (position) component of the proximity probe signal. Two proximity probes mounted in an XY configuration are required for the two-dimensional radial position measurement.

*** Axial**

In the same direction as the shaft centerline.

*** Axial Position**

The average position, or change in position, of a rotor in the axial direction with respect to some fixed reference. Typically, the reference is the thrust bearing support structure or other casing member to which the probe is mounted. The probe may observe the thrust collar directly or some other integral, axial shaft surface, as long as it is within about 12 inches of the thrust bearing. Also called thrust position.

*** Balancing**

Adjusting the radical mass distribution of a rotor so that the mass centerline (principal inertia axis) approaches or coincides with the rotor rotational axis. This reduces the 1X lateral vibration of the rotor and the forces on the bearings due to imbalance inertia forces.

*** Bandwidth**

The span between the corner frequencies of a band-pass filter. Normally expressed in terms of frequency for constant bandwidth filters and as a percent of the center frequency for constant percentage (constant Q) filters.

*** Bode Plot**

A pair of graphs in Cartesian format displaying the 1X vibration vector (phase and amplitude) response as a function of shaft rotative speed. The Y axis of the top graph represents 1X phase angle, while the Y axis of the bottom graph represents 1X amplitude. The common X axis represents shaft rotative speed. Sometimes called an imbalance response plot. Also used for 2X, 3X, etc., vibration response vectors.

*** Bow**

A shaft condition such that the geometric shaft centerline is not straight. Usually the centerline is bent in a single plane due to gravity sag, thermal warpage, etc.; however, the bow may be three dimensional (corkscrew). Shaft bow can be detected by measuring the shaft relative displacement with a proximity probe(s) at rotor slow-roll speed.

*** Calibration Weight**

Used in rotor balancing procedures, a weight of known magnitude which is placed on the rotor at a known location, under known operating conditions, in order to measure the resulting change in machine 1X vibration response. In effect, such a procedure "calibrates" the rotor system (a known input is applied, and the resultant output is measured) for its susceptibility to imbalance. Sometimes called "trial weight"

*** Cartesian Format**

A rectangular graphical format consisting of a vertical (Y) axis and a horizontal (X) axis. This format is used to graph the results of one variable as a function of another; e.g., vibration amplitude versus time (trend), amplitude versus frequency (spectrum) and nX amplitude versus shaft rotative speed (Bode).

*** Cascade Plot**

A graph in Cartesian format displaying amplitude versus frequency spectra at series shaft rotative speeds. Shaft rotative speed and amplitude are usually presented on two separate vertical axes. Frequency is measured on the horizontal (X) axis. This data format is used to evaluate the change in vibration frequency characteristics during machine transient conditions.

*** Casing Expansion**

A measurement of the axial position of the machine casing relative to a fixed reference, usually the foundation. The measurement is typically made with an LVDT installed on the foundation at the opposite end of the machine from the point where the casing is attached to the foundation. Changes in casing axial position are the result of thermal expansion and contraction of the casing during startup and shutdown. The measurement is usually incorporated as part of a TSI system.

*** Center Frequency**

For band-pass filters the arithmetic center of a constant bandwidth filter or the geometric center (midpoint on a logarithmic scale) of a constant percentage filter.

*** Channel**

A transducer and the instrumentation hardware to display its output signal.

*** Critical Machinery**

That group of rotating equipment which is absolutely necessary to a major part of the plant process. When critical machinery is not operating, that part of the process is not operating. Machines in this category are usually without spare and are typically monitored continuously.

*** Critical Speed(s)**

In general, any shaft rotative speed which is associated with high (dangerous level) vibration amplitude. Often, critical speed is used to describe a shaft rotative speed equal to a rotor system natural frequency. This is more correctly called a balance resonance speed.

*** Cycle**

One complete sequence of values of a periodic quantity.

*** Decibels**

A numerical expression of the ratio of the power or voltage levels of electrical signals. dB = 10 log P1/P2 = 20 log V1/V2.

*** Difference Analysis**

A method for evaluating the change in a measurement variable. Two sets of data are collected at different points in time, or under different conditions, and are subtracted from each other.

*** Differential Expansion**

The measurement of the axial position of the rotor with respect to the machine casing at some distance from the thrust bearing. Changes in axial rotor position relative to the casing affect axial clearances and are usually the result of thermal expansion during startup and shutdown. The measurement is typically made with a proximity probe transducer mounted to the machine casing and observing an axial surface (e.g., collar) of the rotor. The measurement is usually incorporated as part of a TSI system.

*** Differential Phase**

A technique which measures the phase difference between vibration signals of a chosen single frequency at different longitudinal locations on a rotor system. It is used for location of the source of instability. The vibration signal whose phase leads all others usually indicates the transducer location closest to the source of the instability.

*** Direct Data**

Data or a signal, which represents the original transducer signal. Sometimes called unfiltered, raw, all pass, or overall data or signal.

*** Displacement**

The change in distance or position of an object relative to a reference. Machinery vibration displacement is typically a peak-to-peak measurement of the observed vibrational motion, and is usually expressed in units of mils or micrometres. Proximity probes measure displacement directly. Signal integration is required to convert a velocity signal to displacement.

*** Dual Probe**

A transducer set consisting of a proximity probe and velocity transducer installed radially at the same point (usually in a common junction box on the machine bearing housing). Four separate measurements are provided by this transducer system. The proximity probe measures (1) shaft relative radial position within the bearing clearance, and (2) shaft dynamic motion relative to the bearing. The velocity transducer measures (3) machine casing absolute vibration. When the velocity signal is integrated to displacement and added to the shaft relative signal, the summation represents (4) shaft absolute motion.

*** Dual Voting**

A logical AND relationship between two independent monitor inputs; they must agree before any action is taken. For example, two transducer input signals must both exceed an amplitude set point (usually the Danger set point only) before an actual alarm condition is indicated by the monitor. If only one transducer input exceeds the set point, then no alarm is initiated in the monitor.

*** Dynamic Data**

Data (steady state and/or transient) which contain that part of the transducer signal representing the dynamic (e.g., vibration) characteristics of the measured variable. Typical dynamic data presentations include shaft XY vibration, waveform, spectrum, Cascade, and Waterfall.

*** Error**

The difference between the indicated value and the true value of the measured variable. It is often expressed as relative error, i.e., as a percent of the output reading of the transducer.

*** Essential Machinery**

That group of rotating equipment which is critical to part of the plant process. When essential machinery is not operating, the overall plant is not operating to full capacity. Machines in this category can have a spareor not and are typically monitored continuously.

*** Frequency**

The repetition rate of a periodic vibration per unit of time. Vibration frequency is typically expressed in units of cycles per second (Hertz) or cycles per minute (to more easily relate to shaft rotative speed frequency). In fact, since many common machine malfunctions produce vibration which has a fixed relationship to shaft rotative speed, vibration frequency is often expressed as a function of shaft rotative speed. 1X is a vibration with a frequency equal to shaft rpm, 2X vibration is twice shaft rpm, 0.5X is a frequency equal to one-half shaft rpm, etc.

*** Frequency Component**

The amplitude, frequency and phase characteristics of a component of a dynamic signal.

*** Frequency Response**

The measured amplitude and phase response characteristics of a mechanical or electronic system with respect to frequency.

*** g**

The value of acceleration yielded by the force of earth's gravity, which varies somewhat with latitude and elevation. By international agreement, 9.8 m/s^2 = 386 in/s^2 = 32.17 ft/s^2 has been chosen as the standard acceleration due to gravity.

*** Harmonics**

A series of vibration signal components whose frequencies are integer multiples of the fundamental, or lowest frequency, vibration component.

*** Harmonic Vibration**

Sinusoidal vibration with a single frequency component.

*** Hertz**

(Hz) Unit of frequency measurement in cycles per second.

*** High Frequency**

For purposes of studying rolling element bearings, a frequency range, typically above 5 kHz, used to measure the very high vibration frequencies associated with microscopic faults in bearing components.

While this technique may provide the earliest warning of impending bearing failure for some types of bearing faults, there are several other machine malfunctions which can produce vibrations in this range (e.g., cavitation, rubs, etc.) In addition, the high frequency measurement technique sometimes provides warnings too early, long before any maintenance (bearing replacement) needs to be considered.

*** Hysteresis**

The difference in levels (dead band) between the trigger threshold and the reset designed to reduce false triggering.

*** Inertially Referenced**

Motion that is referenced to a mass whose inertia keeps it stationary, yielding absolute motion. Also describes a transducer with an internal inertial reference mass.

*** Phase Reference Pulse**

That change in the output signal of the phase reference transducer caused by the phase reference event.

*** Micro-inch**

A unit of length or displacement equal to 10^-6 inches or 10^-3 mils.

*** Micro-meter**

A unit of length or displacement equal to 10^-6 meters. One micro-meter equals 0.0394 mil. Also called micron (obsolete).

*** Mil**

A unit of length or displacement equal to 0.001 inch. One mil equals 25.4 micrometers.

*** Mode Shape**

The deflected shape of a rotor at a specific rotative speed caused by an applied specific forcing function such as imbalance. Note, this is a three dimensional presentation of rotor lateral deflection in vibration mode along the shaft axis.

*** Natural Frequency**

The frequency of free vibration of a system. The frequency at which a lightly damped system will oscillate upon momentary displacement from its steady position by a transient force. The natural frequencies of a multiple degree of freedom system are the frequencies of the normal modes of vibration.

*** Noise**

Any component of a transducer signal which does not represent the variable intended to be measured.

*** 1X**

In a complex vibration signal, notation for the signal component that occurs at the rotative speed frequency. Also called synchronous.

*** 1/2X, 1/3X, 2/5X, 4/9X, ETC.**

In a complex vibration signal, notations for signal components having frequencies equal to fractions of rotative speed. Also called sub-harmonic and sub-synchronous.

*** Shaft XY Vibration**

The dynamic, two dimensional path of the centerline motion of a machine component, which is observed by XY transducers, in the plane of those transducers. When the transducers are XY shaft proximity probes, it is the shaft centerline lateral vibration, called precession. Observed with an oscilloscope in the X versus Y mode. Sometimes called orbital motion.

*** Peak-to-Peak Value**

The difference between positive and negative extreme values of an electronic signal or dynamic motion. See Amplitude.

*** Period**

The time required for a complete oscillation or for a single cycle of events. The reciprocal of frequency.

*** Periodic Vibration**

Oscillatory motion whose amplitude pattern repeats in time.

*** Phase Lag Angle**

The timing relationship, in degrees, between two vibration signals, or a phase reference pulse and a vibration signal; also, the phase difference between two signals such as the input force signal and output response signal. The "lag" corresponds to "minus" in mathematical formulations.

*** Polarity**

In relation to transducers, the direction of output signal change (positive or negative) caused by motion toward or away from the transducer in its sensitive axis. Convention is that motion toward the transducer will produce a positive signal change.

*** Polar Format**

A graphical format consisting of a center reference point surrounded by concentric circles. Vector information is graphed on this format by plotting magnitude (vibration amplitude) as the length of a radial line, and phase (vibration phase lag angle) as the clock position of the line.

*** Polar Plot**

Polar format presentation of the locus of the 1X (or 2X) shaft vibration vector from a single channel as a function of shaft rotative speed. The Polar Plot is generated by in-phase and quadrature signals, usually during machine startup or coast down (transient operation).

*** Probe Gap**

The physical distance between the surface of a proximity probe tip and the observed surface. The distance can be expressed in terms of displacement mils, micrometers, or in terms of voltage (millivolts). Standard polarity convention dictates that a decreasing gap results in an increasing (less negative) output signal.

*** Probe**

Specifically, a proximity probe transducer, although sometimes used to describe any transducer.

*** Probe Orientation**

The angular location of a probe with respect to a polar coordinate system when viewed from the driver end of the machine. Typically, zero degrees are at top dead center (vertical) or at the horizontal right (3 o'clock) position on the coordinate system.

*** Proximity Probe**

A non-contacting device which measures the displacement motion and position of an observed surface relative to the probe mounting location. Typically, proximity probes used for rotating machinery measurements operate on the eddy current principle and measure shaft displacement motion and position relative to the machine bearing(s) or housing.

*** Radial**

A direction on a machine which is perpendicular to the shaft centerline in the XY plane; usually refers to direction of shaft lateral or casing motion or measurement.

*** Radial Vibration**

Shaft dynamic motion or casing vibration which is measured in a direction perpendicular to the shaft axis.

*** Relative Vibration**

Vibration measured relative to a chosen reference. Proximity probes measure shaft dynamic motion and position relative to the probe mounting, usually the bearing or bearing housing.

*** Relative Transducer**

A proximity probe observing shaft motion relative to the probe mounting, usually the bearing or bearing housing.

*** Repeatability**

The ability of a transducer or readout instrument to repeat measurements, under the same conditions, within narrow limits. Precision is the measure of repeatability.

*** Resolution**

The smallest change in applied stimulus that will produce a detectable change in the instrument output.

*** Resonance**

The condition in which a forcing frequency coincides with a natural frequency of the system. A resonance typically is identified by an amplitude peak, accompanied by a maximum rate of change of phase lag angle.

*** Root Mean Square (RMS)**

Square root of the arithmetic average of a set of squared instantaneous values. Used as a measure of amplitude; rms equals 0.707 x peak (sine wave only). (0.707 = 1/squareroot (2)).

*** RTD**

An acronym for Resistance Temperature Detector; a sensor which measures temperature and change in temperature as a function of resistance.

*** RUB**

Machine malfunction consisting of contact between the rotating and stationary parts of a machine involving friction, impacting, and changes in system stiffness.

*** Seismic Transducer**

Any vibration transducer which measures the absolute vibration of an object. Acceleration transducer and velocity transducers measure absolute vibration, typically of machine housing or structures, and thus are both referred to as seismic, or inertial, transducers.

*** Sensitivity**

The ratio of the change in the output to a change in the input. A typical sensitivity for a proximity probe transducer is 200 millivolts per mil (7.84 volts per millimetre).

*** Shaft Centerline Plot**

Transient or trend plot of the shaft average radial centerline position within the bearing clearance, presented in Cartesian format.

*** Shaft Rotative Speed**

The frequency at which a shaft is rotating at a given moment, usually expressed in units of revolutions per minute (rpm); may also be expressed in radians per second (mostly for laboratory work). 100 rpm equals approximately 10 radians per second; (100 rpm = 100 PI/30 radians per second).

*** Slow-Roll Speed**

Low rotative speed at which dynamic motion effects from such forces as imbalance are negligible. The speed at which shaft bow can be measured.

*** Spectrum**

Commonly a presentation of the amplitudes of a signal's components as a function of its frequency.

*** Spectrum Plot**

An XY plot in which the X axis represents vibration frequency and the Y axis represents vibration amplitude.

*** Static Data**

Data which describes the quantitative characteristics of the measured parameter. Static data can also include quantitative values describing the conditions under which the parameter was measured. For predictive maintenance purposes, static data is typically presented in various forms of trend plot.

*** Sub-harmonic**

Sinusoidal component of a vibration signal that is a sub-multiple (integer fraction) of a fundamental frequency.

*** Sub-synchronous**

Component of a vibration signal which has a frequency less than shaft rotative speed.

*** Super-harmonic**

Sinusoidal component of a vibration signal that is an integer multiple of a fundamental frequency.

*** Super-synchronous**

Component of a vibration signal which has a frequency greater than shaft rotative speed.

*** Synchronous**

The component of a vibration signal that has a frequency equal to the shaft rotative frequency (1X).

*** Thermocouple**

A temperature sensing device comprised of two dissimilar metal wires which, when thermally affected (heated or cooled), produce a proportional change in electrical potential at the point where they join.

*** Threshold**

The level at which a trigger or other function is initiated.

*** Transducer**

A device for translating the magnitude of one quantity into another quantity. The second quantity often has units of measure different from the first and serves as the source of a useful signal. Vibration transducers convert mechanical motion into a proportional electronic signal (typically a voltage-proportional signal).

*** Transient Data**

Data acquired under transient machine conditions (startup and coast-down).

*** Trend Data**

The periodic recording/storage of static and/or dynamic data for the purpose of observing changes as a function of time. Trend data is the most fundamental level of information in any predictive maintenance program.

*** Trend Interval**

The time period between consecutive data points on a Trend Plot.

***Trend Plot**

A presentation in Cartesian format or polar format of a plot with the measured variable versus time.

*** Trigger**

Any event which can be used as a timing reference. A trigger for an oscilloscope will initiate the sweep of the beam across the face of the CRT. A trigger signal for a digital vector filter is a phase reference pulse which serves to align the center frequency of the band-pass filter to shaft rotative speed. It provides a reference from which to measure shaft rotative speed, 1X amplitude and phase lag angle.

*** TSI**

Acronym for Turbine Supervisory Instrumentation. A TSI system is a continuous monitoring system generally used on turbo generator sets. It can include such measurement parameters as shaft radial vibration, shaft absolute vibration, axial position, differential expansion, case expansion, valve position, eccentricity peak-to-peak, zero speed, and shaft rotative speed. The system may also include a vector filter which measures vibration phase lag angle for each vibration frequency.

The TSI system consists of measurement transducers, monitors, interconnecting wiring and usually strip chart recorders or a microprocessor-based monitoring/data acquisition system.

*** 2X, 3X, ETC.**

In a complex vibration signal, notation for signal components having frequencies equal to exact multiples of shaft rotative speed. Also called harmonic, super-harmonic, and super-synchronous.

*** Unbalance**

Unequal radial mass distribution on a rotor system; a shaft condition where the mass centerline (principal inertial axis) does not coincide with the geometric centerline. Also, the effective mass that causes rotor vibration.

*** Vector**

A quantity which has both magnitude and direction. For a vibration vector, magnitude is expressed as amplitude (displacement, velocity, or acceleration) and direction as phase lag angle (degrees). For example, the 1X vibration vector measured at shaft operating speed, e.g., for balancing purposes, will be described as a magnitude (mils or micrometres) acting in a particular direction (degrees). The vector data presentation which is easiest to interpret is the polar format.

*** Velocity**

The time rate of change of displacement. Typical units for velocity are inches/second or millimeters/second, zero-to-peak. Velocity measurements are used to evaluate machine housing and other structural response characteristics. Electronic integration of a velocity signal yields displacement.

*** Vibration**

The oscillatory (back and forth) motion of a physical object.

*** Waterfall Plot**

Similar to Cascade plot, except that one vertical axis is usually time instead of shaft rotative speed (rpm).

*** Waveform**

A presentation or display of the instantaneous amplitude of a signal as a function of time.

*** XY**

Orthogonal (perpendicular) axes in a Cartesian coordinate system. Usually used as a reference for orthogonal (mutually perpendicular) radial vibration transducers. Y represents the vertical axis and X represents the horizontal axis.

*** Zero-to-Peak Value**

One-half of the peak-to-peak value.

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